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A NUPTIAL PERFORMANCE OF THE SAGE COCK.

BY FRANK BOND.

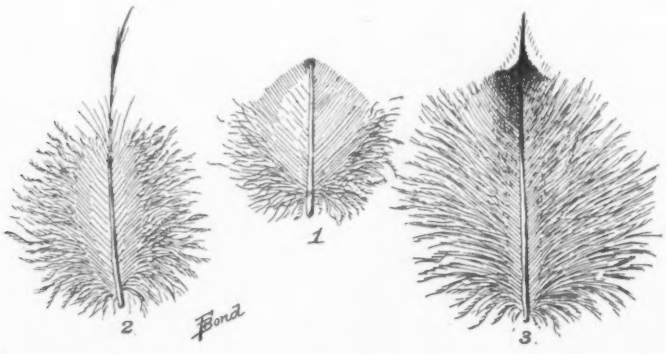
Plate XII.

THE peculiar feathers of the breast of the Sage Cock (*Centrocercus urophasianus*) are more or less faithfully described by every ornithologist who has published a sketch of the bird; but as yet I have seen no explanation of the cause of the wearing away of the barbs and even shafts of the feathers of the lower neck. These feathers are worn away during that period of sexual excitement which causes many birds to develop odd and eccentric habits until the nuptial season is passed. The Sage Cock is unable to produce the musical booming sound of the Prairie Chicken, the forcible expulsion of the air from the sacks producing an inconsequential chuckling noise only; nevertheless the bird offers reasonable entertainment to any individual who will rise early and stroll out into the sage brush a hundred yards from the camp fire.

During the months of April and May the Sage Cocks are usually found in small flocks of a half dozen or more, stalking about with tails erect and spread after the manner of the strutting turkey cock, but I have never seen the Grouse dragging their wings upon the ground, turkey fashion, and in the manner described by Dr. Newberry in the quotation from this author

found on page 406 of Dr. Coues's 'Birds of the Northwest,' nor have I ever found a wing of a Sage Cock, in this or any other season, which exhibited the slightest wearing away of the primaries. Instead of dragging its wings upon the ground the Sage Cock will enormously inflate the air sacks of the neck until the whole neck and breast is balloon-like in appearance, then stooping forward, almost the entire weight of the body is thrown upon the distended portion and the bird slides along on the bare ground or short grass for some distance, the performance being concluded by the expulsion of the air from the sacks with a variety of chuckling, cackling or rumbling sounds. This performance is continued probably daily, during the pairing and nesting season, and of course the feathers are worn away by the constant friction.

The brush drawing (Plate XII) shows the position taken by the Sage Cock while engaged in the eccentric performance described above, while the line drawings show the effect of the sliding friction upon the feathers of the inflated area. These drawings (Figs. 1–3) were made of feathers taken from an old Sage Cock killed in December and the question arises — are these feathers ever moulted, and if so, when? Fig. 1 is the type of feather which almost surrounds the air sacks, when the same are exhausted,



for the space of an inch or more. These are evidently worn half away. Fig. 2 is a type of the next circlet below, and Fig. 3 of those just above (or just below when the bird stoops forward)

the black feathers of the breast which are untouched. The black and naked barbs shown in Fig. 2 give that portion of the breast its hairy or bristly appearance.

An effort to assign a cause for this peculiar habit of the Sage Cock would be entering the purely speculative field, but the sliding of the widely distended air sacks over an uneven surface, together with the additional rumbling produced by the stiffened worn-off feathers, undoubtedly produce, to the ears of the bird at least, a volume of sound that is simply tremendous. A spectator, however, can hear nothing until the air sacks are collapsed.

'APTOSOCHROMATISM.'

BY J. A. ALLEN.

IN 'Science' of Feb. 23, 1900 (N. S., XI, pp. 292–299) Mr. F. J. Birtwell describes at considerable length, what he considers a case of 'The Occurrence of Aptosochromatism in *Passerina cyanea*.' He says: "The following remarks upon Aptosochromatism of *Passerina cyanea*, although of insufficient importance to establish the phenomenon of color change without moult as a constant occurrence in the species, are conclusive enough, I am convinced, to prove the possibility of such a change, and are merely offered as such for what they may be worth." Several paragraphs, by way of introduction, relate to the general subject, in which Mr. Birtwell regrets that "Individual error and dogmatism have greatly retarded honest effort in this most important branch of ornithological science. It is a singular fact that certain individuals have conceived the idea that a feather once having passed its premature condition is utterly disconnected with the vital system of the bird, and such individuals cling to this belief with a tenacity wonderful to behold." His remarks, he tells us, "are based chiefly upon observations conducted during the fall, winter, and early spring of 1898–99, upon a captive bird." He presents a table

showing loss of feathers from Nov. 1 to Feb. 11, and adds that from Feb. 11 to Feb. 28 "an average of 50 contour feathers was lost daily," and that "the loss had abruptly ceased" by March 5. (The bird died March 29.) The total loss of contour feathers was estimated at 1350, or about three-fifths of the bird's entire plumage. He says: "To many observers my bird by March 5th would have been pronounced to be completely moulting." This feather loss he does not consider as normal, but as resulting indirectly from the bird's timid, fretful temperament, many of his feathers becoming more or less injured by his "wild fluttering" in the cage, and consequently shed, as, "when such a vital process as Aptosochromatism [with a big A] begins to work, these decrepit feathers necessarily would have to be renewed in order to take part in the general plan.... It will be noticed in the table how gradually the loss began, due doubtless to the gradual approach of activity towards color change in the feathers. It must be admitted that this explanation is purely hypothetical, but such a hypothesis, although not of fundamental importance, oftimes prepares the way for a clearer understanding of the problem under consideration."

"The first appearances of color change," he says, "were noticed in some of the old feathers of the crown during the first week in February," when "a brightening of the blue area of the feather was noticed, but no perceptible change of color at the tips where the russet was.....When the band of tawny was reached, it appeared to be slowly absorbed until but faint tips of this color could be seen upon the ends of the larger barbs. In no cases were the barbs or barbules broken off sufficiently to account for the change." After describing the general course and character of the color change over the body Mr. Birtwell sums up as follows: "While my bird threw out no hint whatever as to the constant occurrence of the color change, it did prove that the 'impossibility' is possible. It is certain that the heavy feather loss of my bird but indirectly helped the change: 1st, we have seen that many feathers changed which were not renewed by moult; 2d, we saw that those feathers which were renewed by direct gain and loss were colored similarly to those which preceded them, but that later on they changed Aptosochromatically, and 3d, no purely blue, *i. e.*,

changed feathers were found in an embryonic condition at any time, although frequent careful examinations of the bird were made." This, as will be noted later, is, taken altogether, a fine exposé of Mr. Birtwell's ignorance of what normally occurs in respect to color change without moult, or by simple normal abrasion. He goes on to say that in feathers examined under the microscope in January and February he "could detect no presence of carrier pigment cells and found the calamus of each feather to be in the expected dried up condition. The change would thus seem to be confined to activity in the feathers alone." (l)

His conclusions from this study are: "(1) that Aptosochromatism in my *Passerina cyanea* occurred beyond doubt, (2) that although present with severe feather loss it does not follow that the gain of color was directly responsible to it, as proved by careful examination of the newly acquired feathers, and (3) that although the feather loss was objectively independent of the Aptosochromatic change, it might subjectively be so, inasmuch as old and imperfect feathers were renewed for active and healthy ones, in which such a color change subsequently occurred."

Dr. J. Dwight, Jr., in a later number of 'Science' (April 30, 1900, pp. 627–630), under the title 'The Plumage and Moults of the Indigo Bunting,' reviews Mr. Birtwell's paper at some length, describing in detail the successive stages of plumage of this bird, and criticising with some sharpness the class of work Mr. Birtwell's paper so characteristically illustrates. After quoting some of Mr. Birtwell's comments on the attitude of the opponents of the theory of 'Aptosochromatism,' transcribed at the beginning of this review, in which he says "they cling to their belief with a tenacity wonderful to behold," Dr. Dwight says: "Doubtless it does seem 'wonderful' to persons who would wave aside all the careful observations that have been made upon feather growth and feather wear, and plumage generally, but possibly it is not so wonderful as the strange things they see just as soon as they watch a bird of striking colors in a cage." Dr. Dwight also indulges in some comment on the general subject. After his account of the changes of plumage in the Indigo Bunting, he says: "Here then we have the facts about the Indigo Bunting, and any

specimens taken at the proper time of year will verify them. Nevertheless, Mr. Birtwell thinks that 'for good results in investigations upon color change one should operate rather upon live birds in confinement.' Well, perhaps so, for the 'proof' of color change without moult certainly does rest chiefly upon caged birds. The fact that they moult irregularly and often at long intervals and, as for instance in the Purple Finch (*Carpodacus purpureus*), having once lost their bright colors may never regain them does not seem to impair belief in a theory fifty years or more old. It began when most people were ignorant of the fact that birds could and did moult twice in the year. This was sagely declared to be too great a drain upon their vitality; but when it was found that some species did moult twice, theory had to be reserved for others that did not appear to be guilty of draining their vitality. When these in turn were proved to moult twice refuge was taken in the assumption that only certain individuals of certain species changed color without moult. Later came red-handed proof of guilt in feathers found growing upon these individuals and the believers in theory fell back upon the claim that although one feather did seem to be renewed by moult, the one next to it underwent a color change, concerning the nature of which no two believers were agreed. Some of them have gone so far as to assert rejuvenation of frayed edges by some sort of exudative processes which only need to be carried a step farther to eliminate altogether the necessity of moult. This is no fancy picture and I only paint it that my readers may know what 'aptosochromatism' represents."

Referring more directly to Mr. Birtwell's article, Dr. Dwight remarks: "An observer who did not know the plumage differences between the adult and the young bird, nor discover the structural differences between autumnal and nuptial feathers, nor hesitate to look for 'carrier pigment cells' under the microscope, may well have his accuracy of observation questioned. . . . . When the well-established laws of feather growth and feather loss fail to account for plumages, it will be time enough to adopt theories demanding new life in epidermal structures, that for many months have been histologically dead. The existence of such a thing as 'aptosochromatism' will hardly be proved by those who have no

grasp upon fundamental principles, and as long as such observers expect to be taken seriously, they must not be surprised if they are called sharply to account."

A careful study of Mr. Birtwell's paper has convinced me that there is nothing very unusual about Mr. Birtwell's caged Indigo Bunting. No 'hypothesis' is necessary to account for its moulting at the time it did, nor would Mr. Birtwell have thought any 'hypothesis' necessary if he had known the simple facts that the species normally moults twice a year, and that the prenuptial moult is ordinarily more or less incomplete. Nor is there anything in the color changes described incompatible with the belief that the changes observed were wholly due to the normal shedding of the tips of the feathers, both in the new feathers and in the old ones. The gradual wearing off of the tips of the feathers necessarily results in the exposure more and more of the previously concealed blue basal portion of the feathers underneath them, which would result in "the apparent brightening of the blue portion of the feather, beginning evenly on each vane from the bottom," as remarked by Mr. Birtwell. He further says: "When the band of tawny was reached, it appeared slowly to be absorbed until but faint tips of this color could be seen upon the ends of the larger barbs." Here almost certainly Mr. Birtwell's observations were in error, as he could easily have himself detected had he been familiar with the differences in structure between the fugacious buffy tip and the main body of the feather; although he gives it as his opinion that "in no case were the barbs or barbules broken off sufficiently to account for the change." There is nothing to indicate that Mr. Birtwell's bird was not a male of probably the second (possibly of the previous) year undergoing (1) the normal spring moult of the species and (2) gradually changing color, in case of both the old plumage and the new, by the usual wearing away of the fugacious brown feather tips and gradually exposing more and more of the previously concealed basal portions of the feathers, as occurs normally, to a greater or less extent, in hundreds of species of our birds, and so markedly in such species as the Snowflake, Bobolink, and many others that might be mentioned.

Mr. J. Lewis Bonhote has also shown of late much interest in

'aptosochromatism'; but, perhaps to his credit, is content with the more commonplace phrase 'colour-change' to designate "an alteration or rearrangement of pigment in the fully-grown feather," including as well "an influx of pigment into a fully formed feather." In 'The Zoölogist' for January, 1900 (pp. 29–31), he has a paper 'On the Moult and Colour Changes of the Corn-crake (*Crex pratensis*)," in which he points out that "the Corn-crake undergoes a complete moult in spring, the new dress resembling its winter plumage." He adds that "the slate-colour of the breeding-dress is, however, assumed immediately after the moult by *a change of colour*"! In a later paper, published in 'The Ibis' for July, 1900 (pp. 464–474), entitled 'On Moult and Colour-change in Birds,' he again refers to the Corn-crake, and cites this case as disproving the widely entertained belief that 'colour-change' relieves "the severer strain on the system" caused by moult since in this species there is both a spring moult and a 'colour-change.'

The paper just cited is called forth, Mr. Bonhote tells us, by "three recent papers on the subject which have appeared in American periodicals," these being (1) Dr. Chadbourne's in 'The Auk' (XIV, 1897, pp. 137–149) on the 'Spring Plumage of the Bobolink'; (2) a paper by the present writer published in 1896 (Bull. Am. Mus. Nat. Hist. VIII, pp. 13–44), entitled 'Alleged Changes of Color in the Feathers of Birds without Molting'; and (3) Mr. Witmer Stone's paper in the Proceedings of the Academy of Natural Sciences of Philadelphia (1896, pp. 108–167), on 'The Molting of Birds with Special Reference to the Plumages of the Smaller Land Birds of Eastern North America.' Mr. Bonhote, being an 'aptosochromatist,' finds much in Dr. Chadbourne's paper to approve, while the other two articles are made the subject of considerable adverse criticism. With regard to Mr. Stone's paper it is pointed out that it is incomplete, inasmuch as "the Limicolæ and Gamebirds have been left untouched." As Mr. Bonhote has considerable to say about some of the former, as the Ruff and the Golden Plover, it seems a little strange that he does not mention Mr. Chapman's paper on 'The Changes of Plumage in the Dunlin and Sanderling,' which immediately precedes in the same volume (Bull. Am. Mus. Nat. Hist., VIII, 1896, pp. 9–12), one of the papers to which he devotes attention.

Apropos of Dr. Chadbourne's paper on the Bobolink, Mr. Bonhote says: "The Bobolink is not the only bird in which the assumption of the breeding plumage varies in different individuals. From the head of *Larus ridibundus* I have taken at the same time new brown feathers and old feathers in process of change, while in other individuals *there has been a pure colour-change.* The Ruff is an instance of the change going on in *two different ways simultaneously.* The Ptarmigan, again, is another instance, and from the examples of this species which I have examined I think it doubtful whether it assumes any one of its plumages in a uniform manner. The fact that a bird will assume its breeding plumage in some feathers by a change of colour, and in others by a change of feather, *leads to the supposition* that pigment *can* find its way up an old and fully-grown feather. It does not seem to me unlikely that, at a certain season, pigment — which is chiefly a waste product, more abundant, on account of the extra energy expended, at the approach of spring — should be deposited in the follicles of the feathers. If the follicle is at that time engaged in producing a *new* feather, the pigment is placed in it; if not, *it is drawn up into the feather which is already full grown"!*

This quotation shows fairly Mr. Bonhote's position. Respecting the portions here placed in italic type, I beg to offer a few words of comment. First, as to the *Larus ridibundus*, it seems strange that I have never been able to detect, in any of the large number of specimens I have examined of its closely allied congeners, any "old feathers in process of change," but always, in birds taken at the proper season, plenty of new black feathers in all stages of growth. As to the Ptarmigan, I would call Dr. Bonhote's attention to Dr. Dwight's paper in the April number of this Journal, published before Mr. Bonhote's paper appeared. Dr. Dwight's whole article on 'The Moult of the North American Tetraonidæ' (Auk, XIII, 1900, pp. 34–51, 143–166), I hope will be not only read, but most critically studied by all who share Mr. Bonhote's views on 'colour-change.' Says Dr. Dwight (*l. c.*, pp. 147, 149): "The study of this material [just previously enumerated], amounting to nearly two hundred specimens, now enables me to explain the parti-colored plumages of these birds, a matter that has long baffled investigation and given rise to a belief

that individual feathers themselves change color without being moulted. It has been believed by some that Ptarmigans moult continuously and in a haphazard way during the whole year. All of these ideas have arisen from a misconception of the facts, which show that the feathers supposed to be changing color or pattern are of that particular color and pattern at the time they first expand, and that the continuous moult resolves itself into definite periods, and that the feather growth is systematic, differing in no respect from that of the rest of the Grouse. The one essential difference between the moults of the Ptarmigans and those of the Grouse is found in the extra moult in the autumn by which the brown feathers regularly assumed at the usual periods of moult in both young birds and old are replaced by white ones. . . . .

"The plumages of the Ptarmigans are puzzling not only on account of the plumage intermediate between summer and winter dress, but also on account of the rapidity with which the moults follow each other, one beginning before the previous one is completed, and apparently overlapping at some points. Moreover, the incompleteness of the partial moults with the irregular retention of feathers peculiar to them adds to the confusion of ideas resulting from seeing together an assemblage of feathers belonging to several different stages of plumage. As for the rapidity with which one moult treads upon the heels of another, it can only be said that the mode of life of the Ptarmigans requires it and the activity of the feather papilla is no greater than the necessity. As a matter of fact, some papillæ produce approximately one feather in May, another in July and a third in September, but there are many which produce but two feathers during this period and others only one, while all of them are dormant during the long winters."

In respect to "the supposition that pigment *can* find its way up an old and fully-grown feather," Mr. Bonhote assumes that this supposition is true, and that, in the season of moult, "if the follicle [of a feather] is at that time engaged in producing a *new* feather, the pigment is placed in it; if not, *it is drawn up into the feather which is already full-grown.*" This latter affirmation, put forth as a statement of known fact, rests entirely upon a series of

wholly inadequate assumptions, namely: (1) the case of the Golden Plover, in which he says, "if a specimen be examined in spring, we find the white feathers on the breast in all stages of colour between white and black. Messrs. Allen and Stone would have us believe that these are all new feathers, which have grown of that colour, and which will always remain of that colour." In summer Mr. Bonhote finds that the "many birds in the full summer dress" that he has examined rarely have "more than one or two feathers in this half-and-half stage on any single individual." The conclusion reached is that the Golden Plover assumes the breeding dress "by direct moult" on the back while it acquires its black breast by the white feathers *turning black*. "The new growing feathers on the breast," he says, "are *white*, not black or particoloured, and then change to the black summer dress." I cannot say from personal observation what the European Golden Plover does, but the American Golden Plover and its near ally, the Black-breasted Plover, acquire the black breast feathers by a moult, as the examination of a large number of specimens has abundantly shown.[1] (2) As to the physiological process involved in this change of white feathers to black ones, Mr. Bonhote says: "I am not in a position to write about it at present, but should like to draw attention to a paper by M. V. Fatio, in which he shows that an oil is continually making its way into the feather from the body." As "most pigments are soluble in ether, alcohol, or chloroform," they are thus proved "to be of an oily nature. Now, if it has been proved that oil can make its way up a feather, and, further, that all true pigments (black, red, and their combinations) are of an oily nature, it necessarily follows that pigment can make its way up also." Yet it is admitted "that this flow is not due to any active agent, but to osmosis, capillarity, or some similar action"! We know the results of capillarity; its action is evident as a mechanical process in a thousand ways. But what has this to do, we may ask, with the

[1] Since this article was sent to the printer we have received the manuscript of Dr. Dwight's important paper, given later in this number of 'The Auk,' on the 'Moult of the North American Shore Birds (Limicolæ),' to which the reader's attention is especially called in reference to the Golden and Black-bellied Plovers.

(1) secretion of pigment by the vital action of a pigment secreting organ, and (2) the transmission of the pigment through the structure of a fully matured feather, and hence (according to the best histologists) a histologically dead organ. Because an oil or a dye can diffuse itself through a skein of yarn or over the external surface of a feather, and possibly penetrate its porous structure, Mr. Bonhote claims that such experiments "clearly prove that it is quite possible for pigment deposited at the *base of a feather* [just where and in what manner?] to work its way up by *purely physical means*. If an artificial pigment can do this, we need have no doubt that it is possible for a natural pigment to do the same."

Here, then, is the whole basis of the theory of 'color-change' in feathers, or 'aptosochromatism,' as set forth by one of its latest supporters; an assumption to my mind, resting: (1) on erroneous observation, and (2) on conjecture of what may or ought to happen if this belief in 'colour-change' were true. Victor Fatio's above cited observations and conclusions, published a generation ago, need not awaken much surprise, but it is a matter for astonishment that they should find supporters in this closing year of the nineteenth century.

Since Mr. Bonhote finds that I have "adduced no proofs in favour of non-colour change" in my paper on this subject published in 1896, it is hardly worth while to discuss the subject further in the present connection. In view of such a statement, however, I can hardly believe that my critic has given the paper in question very careful attention. As the subject is at present receiving renewed consideration, I am quite willing to await the results of expert investigators in this special line of research, both from the histological side and from the standpoint of the student of moult and plumage change in general. As Dr. Dwight, who has already spent years in the study of this subject, has well said: "When the well-established laws of feather growth and feather loss fail to account for plumages, it will be time to adopt theories demanding new life in epidermal structures, that for many months have been histologically dead."

NOTES ON THE BIRDS OF REFUGIO COUNTY, TEXAS.

BY JAMES J. CARROLL.

THE following notes are based on observations made by the writer in Refugio County, southern Texas, during the winter and spring of each year since 1896. The list, while not complete, gives a very fair idea of the avifauna of the county. Refugio County is joined on the west by Bee County where observations have been made and results published by Messrs. Beckham and Sennett, and only a short distance north of Nueces County, which territory has been studied by such eminent ornithologists as Sennett, Hancock, Beckham and Chapman. The results of their researches have been published in the proceedings of various scientific societies.

The San Antonio and Aransas Rivers form respectively its northern and southern boundaries. The interior of the county is well watered by the Mission River and Blanco, Medio, Sauz, Melon, Copano and Chocolate Creeks and other small streams. There are also a number of large fresh water lakes which afford suitable winter habitation for many aquatic species. The eastern border is indented by the Heines Bay, and the southern by the Mission and Copano Bays. The country is flat, has little elevation and is for the most part a prairie, covered more or less with chaparral. There are some groves, however, of red oak (*Quercus rubra texana*), post oak (*Q. stellata*), and live oak (*Q. virens*), which cover considerable areas. The rivers are heavily fringed with the pecan (*Carya oliviæformis*), cottonwood (*Populus monilifera*), etc. A broad belt of territory bordering the coast is well timbered with mesquite (*Prosopis juliflora*). The 'mottes' mentioned so frequently are composed of the hackberry (*Celtis occidentalis*) and anaqua (*Ehretia elliptica*), and are dispersed over the prairies at varying intervals. Other trees occurring commonly are huisache (*Acacia farnesiana*), granjeno (*Celtis pallida*), etc.

These brief preliminary and explanatory remarks the writer has

thought, will enable the reader to better understand certain parts of this paper.

1. **Larus argentatus smithsonianus.** AMERICAN HERRING GULL. — Common on the bays in winter.

2. **Larus delawarensis.** RING-BILLED GULL. — Also common on the bays during winter.

3. **Larus atricilla.** LAUGHING GULL. — Very common resident near the bays. Breeds commonly on the islands during the latter half of June.

4. **Sterna caspia.** CASPIAN TERN. — Tolerably common on the bays. Breeds on the islands in May and June.

5. **Sterna maxima.** ROYAL TERN. — Much commoner than *S. caspia*, which it so closely resembles. Breeding localities and dates about the same.

6. **Gelochelidon nilotica.** GULL-BILLED TERN. — Tolerably common breeder on the islands.

7. **Sterna forsteri.** FORSTER'S TERN. — Common on the bays. Breeds.

8. **Sterna antillarum.** LEAST TERN. — Not very common.

9. **Hydrochelidon nigra surinamensis.** BLACK TERN. — Have found this Tern to be rare; frequents inland ponds. Though they remain as late as May, have never found them breeding.

10. **Rynchops nigra.** BLACK SKIMMER. — One of the most common birds on the bays, breeding in great numbers on the islands in May and June. Local name 'Shearwater.'

11. **Anhinga anhinga.** ANHINGA. — Not rare, nor yet very common. I have seen quite a number on the Arroya Chocolate, which is well fringed with trees, in May, and I think it very probable that they breed there, though I have not found a nest. Have been told by competent observers that they breed in the county. Local name, 'Water Turkey.'

12. **Phalocrocorax mexicanus.** MEXICAN CORMORANT. — Fairly common along the beaches. Have seen them in May but did not find them breeding.

13. **Pelecanus erythrorhynchos.** AMERICAN WHITE PELICAN. — A very common species during the winter months and until late spring. They then congregate in great numbers and migrate.

14. **Pelecanus fuscus.** BROWN PELICAN. — Very common at all seasons in all the bays. Breeding season extends over several months, beginning in February. Nests on the islands.

15. **Lophodytes cucullatus.** HOODED MERGANSER. — Rather uncommon winter resident. Local name, 'Sawbill.'

16. **Anas boschas.** MALLARD. — A very common winter resident, abounding in the prairie ponds and lakes. Local name, 'Greenhead.'

17. **Anas fulvigula maculosa.** MOTTLED DUCK. — A fairly common resident. Breeds along the mainland near the beach and on the islands, in April.

18. **Chaulelasmus streperus.** GADWALL. — Common winter resident.

19. **Mareca americana.** BALDPATE. — Fairly common in winter in the prairie ponds and lakes.

20. **Nettion carolinensis.** GREEN-WINGED TEAL. — Common in prairie lakes and ponds, in winter.

21. **Querquedula discors.** BLUE-WINGED TEAL. — Found plentifully in the inland ponds during winter.

22. **Spatula clypeata.** SHOVELLER. — A common creek and pond Duck. Have seen them in pairs in summer in the grassy lakes and think they breed, though I have found no nests. Local name, 'Spoonbill.'

23. **Dafila acuta.** PINTAIL. — One of the commonest of the Ducks; abounds on the bays and also on inland lakes and ponds. Local name, 'Sprig.'

24. **Aythya americana.** REDHEAD. — The abundance of these Ducks and *A. vallisneria* is governed by the quantity of wild celery growing in the bays, upon which they feed. Last winter (1899–1900), there being a most abundant celery crop, these two species were quite common.

25. **Aythya vallisneria** CANVAS-BACK. — Like the preceding, very variable as to numbers. Both the present species and *A. americana* are much sought by the hunters because of the great demand for them. The winter of 1895–96 found Canvas-backs rare, and the local hunters were paid for them at Rockport, $5 per pair.

26. **Aythya affinis.** LESSER SCAUP. — Very common in the bays in winter.

27. **Charitonetta albeola.** BUFFLEHEAD. — A very common pond and creek Duck in winter.

28. **Chen hyperborea nivalis.** SNOW GOOSE. — By far the most common Goose of the county. It abounds everywhere in the vicinity of water; in prairie ponds, lakes and on the bays. Local name, 'Brant.'

29. **Anser albifrons gambeli.** AMERICAN WHITE-FRONTED GOOSE. — Fairly common during winter. Known locally as 'Speckled Brant.'

30. **Branta canadensis.** CANADA GOOSE. — Common during the winter in the bays.

31. **Branta canadensis hutchinsii.** HUTCHINS'S GOOSE. — Very common in the prairie ponds and lakes.

32. **Olor columbianus.** WHISTLING SWAN. — Formerly very common winter resident, but of late years becoming exceedingly rare, and the few that come are very shy. This is because of the persecution by hunters.

33. **Ajaja ajaja.** ROSEATE SPOONBILL. — These exquisite birds I have seen but a few times. They are becoming very rare. Called locally 'Flamingo.'

34. **Ardetta exilis.** LEAST BITTERN. — Tolerably common in the marshes and along water courses. Breeds.

35. **Ardea herodias.** GREAT BLUE HERON. — Still comparatively common, but is being rapidly exterminated by plume hunters. They are found wherever there is water; in the bays, prairie lakes, and ponds, and

along creeks and rivers. Breeds in colonies on the islands and also on the mainland far inland. On the islands the nests are placed in cactus, 'Spanish dagger,' in chaparral, or on the ground. On the mainland, chaparral and small trees are used. Breed from February till May or June. Local name, 'Big Silver-gray Heron.'

36. **Ardea egretta**. AMERICAN EGRET. — Rather uncommon. Has become so within the last few years.

37. **Ardea candidissima**. SNOWY HERON. — One of the species much warred upon by the plume hunters. Hence they are fast becoming scarce. Breeds.

38. **Ardea rufescens**. REDDISH EGRET. — Not very common. Breeds.

39. **Ardea cærulea**. LITTLE BLUE HERON. — Not common, resident.

40. **Ardea virescens**. GREEN HERON. — Very common. Frequents ponds and streams. Breeds abundantly in May. Local name, 'Little Silver-gray Heron.'

41. **Nycticorax nycticorax nævius**. BLACK-CROWNED NIGHT HERON. — Common along the water courses. Breeds commonly in May. Local name, 'Qua Bird.'

42. **Grus americana**. WHOOPING CRANE. — A rather rare winter migrant. Have never seen more than half a dozen in company. Are seen feeding in the shallow prairie ponds and are very wary.

43. **Grus mexicana**. SANDHILL CRANE. — When acorns are in plenty, these Cranes are very common in winter, remaining until late spring. Frequent the oak timber, the prairie and ponds.

44. **Porzana carolina**. SORA. — Saw one of this species in a marsh in May, 1899.

45. **Fulica americana**. AMERICAN COOT. — Tolerably common winter resident. Do not think they remain to breed. Local name, 'Bulldoo.'

46. **Recurvirostra americana**. AMERICAN AVOCET. — Tolerably common.

47. **Himantopus mexicanus**. BLACK-NECKED STILT. — A very common resident on the bays and prairie ponds. Breeds in May.

48. **Gallinago delicata**. WILSON'S SNIPE. — A very plentiful winter resident in all marshy ponds.

49. **Tringa fuscicollis**. WHITE-RUMPED SANDPIPER. — Frequents small ponds during winter months.

50. **Tringa minutilla**. LEAST SANDPIPER. — Tolerably common winter migrant.

51. **Tringa alpina pacifica**. RED-BACKED SANDPIPER. — Common in winter.

52. **Ereunetes pusillus**. SEMIPALMATED SANDPIPER. — Winter resident.

53. **Calidris arenaria**. SANDERLING. — Winter resident.

54. **Totanus melanoleucus**. GREATER YELLOW-LEGS. — Found in small ponds and along water courses in winter.

55. **Totanus flavipes**. YELLOW-LEGS. — Common winter resident.

56. **Symphemia semipalmata inornata.** WESTERN WILLET. — Winter resident. Do not think it breeds.

57. **Bartramia longicauda.** BARTRAMIAN SANDPIPER. — One of the commonest migrants. Very plentiful during migration. In spring of 1899, arrived March 13, and by the 20th was everywhere on the prairies. Local name, 'Plover.'

58. **Numenius longirostris.** LONG-BILLED CURLEW. — A very common migrant, frequenting the prairies. Saw several flocks containing thousands, Nov. 30, 1899.

59. **Charadrius dominicus.** AMERICAN GOLDEN PLOVER. — A very common migrant. Both this species and *B. longicauda* are much hunted for the market. Preëminently a bird of the prairie.

60. **Ægialitis vocifera.** KILLDEER. — Common at all seasons though their numbers are greatly augmented during winter by the migrants from the north. Breed from February to May.

61. **Ægialitis nivosa.** SNOWY PLOVER. — Occurs as a migrant.

62. **Ægialitis wilsonia.** WILSON'S PLOVER. — Tolerably common. May breed, though I have not found a nest.

63. **Arenaria interpres.** TURNSTONE. — Found on the beaches in winter.

64. **Hæmatopus palliatus.** AMERICAN OYSTER-CATCHER. — A very common beach bird, breeding on the islands.

65. **Colinus virginianus texanus.** TEXAN BOBWHITE. — A very abundant resident. Especially common in the chaparral. Also in the high weeds and grass fringing the Aransas River. Breeds commonly in April, May and June.

66. **Tympanuchus americanus attwateri.** ATTWATER'S PRAIRIE HEN. — Formerly abundant but of late years becoming rare. Still a good number are to be found in Roseborough's pasture near Salt Creek. It is fair to presume it breeds there.

67. **Meleagris gallopavo intermedia.** RIO GRANDE TURKEY. — Not so common as a few years ago. I have found a few in the 'Black Jacks,' a region of brush and timber near St. Charles Bay. Possibly a few still remain in the bottoms of the Mission River.

68. **Zenaidura macroura.** MOURNING DOVE. — An exceedingly abundant resident. Possibly more are present in winter, at which season they are gregarious, than in summer. Breed commonly, on the ground and in bushes. A nest containing young was found the second week in January, 1900.

69. **Cathartes aura.** TURKEY VULTURE. — Common resident. An abundant breeder, selecting brush-heaps, clumps of chaparral, caves in arroya banks, and hollow trees as nesting sites, though the hollow trees are used far less by this species than by *C. urubu*. Breeds in April and May.

70. **Catharista urubu.** BLACK VULTURE. — By far the most common of our two Vultures. Constant resident. Nests in hollow trees, under

thick chaparral, and by sides of fallen trees. Nidification season begins earlier with the present species than with *C. aura*, complete sets being found as early as the first half of February.

71. **Elanoides forficatus.** SWALLOW-TAILED KITE. — A rare migrant. Have seen but two or three in the county. Saw one March 29, 1899; another April 6 of the same year. The tall pecan trees bordering the San Antonio River afford most admirable nesting sites, but so far as I can learn, they have never bred in the county.

72. **Ictinia mississippiensis.** MISSISSIPPI KITE. — A very common migrant. Arrived March 6, in 1899. Does not breed.

73. **Circus hudsonius.** MARSH HAWK. — A common winter resident; none remain to breed.

74. **Accipiter velox.** SHARP-SHINNED HAWK. — Rare migrant. Have seen but one and found that dead.

75. **Accipiter cooperi.** COOPER'S HAWK. — Tolerably common in winter. Do not remain in summer.

76. **Parabuteo unicinctus harrisi.** HARRIS'S HAWK. — Common resident. Becomes more common near the coast. Have never seen them in company with *P. cheriway*, nor eating carrion as mentioned by previous writers. Have found their nests in chaparral, scarcely eight feet from the ground, and in the tops of tall trees. Are early breeders, beginning to lay sometimes as early as January. So far as my experience goes, the complement of eggs is more often three or four than two, and immaculate eggs are much commoner than marked ones.

77. **Buteo borealis.** RED-TAILED HAWK. — Not very common, the succeeding subspecies being the predominant variety. Habits identical.

78. **Buteo borealis krideri.** KRIDER'S HAWK. — Rather common resident. Could not be more typical; no subterminal bar; underparts snow-white. Breeding habits similar to those of *borealis*, the main difference being that *krideri* more often places green leaves in its nest. Nidification begins in the latter part of February.

79. **Buteo lineatus alleni.** FLORIDA RED-SHOULDERED HAWK. — Tolerably common in winter. I think none remain to breed.

80. **Buteo albicaudatus sennetti.** WHITE-TAILED HAWK. — Common resident. Frequents the open prairie, which characteristic gives them the local name, 'Prairie Hawk.' Are not molested by ranchmen, who take into consideration their good offices in disposing of noxious mammals. Breed in April and May, placing their nests in top of chaparral or a small tree on the prairie. Eggs two, rarely three, marked eggs being unusual.

81. **Buteo swainsoni.** SWAINSON'S HAWK. — Very common migrant. In spring of 1899 arrived March 28, and was seen in great numbers for two weeks, frequenting alike prairie and wooded land. Their number in 1899 was unusually great.

82. **Aquila chrysaëtos.** GOLDEN EAGLE. — Perhaps I should note this Eagle as of doubtful identification, as I did not take the specimen, and it is

so far south of its usual range. But I am almost positive that it was *A. chrysaëtos*, being familiar with all plumages of *H. leucocephalus*. I saw but one, in 1896, and have not seen it since.

83. **Haliæetus leucocephalus.** BALD EAGLE. — By no means rare. Pre-ëminently a bird of the prairie. At Willow Lake, during the duck season, I have seen as many as a dozen at once. Their chief diet in winter consists of Ducks and Geese which have been winged by gunners. Nests invariably in the vicinity of prairie ponds. Breeds early — November and December. Nests placed in low trees, sometimes at no greater distance from the ground than 15 feet. Eggs two, very rarely three.

84. **Falco peregrinus anatum.** DUCK HAWK. — Rather uncommon winter resident.

85. **Falco columbarius.** PIGEON HAWK. — Rare winter resident. Have seen a few. The stomach of one killed Jan. 21, 1898, contained the remains of small Sparrow.

86. **Falco richardsoni.** RICHARDSON'S MERLIN. — Very rare.

87. **Falco sparverius.** AMERICAN SPARROW HAWK. — Not rare in winter. None remain through the summer. The winter residents are largely reinforced in early April by migrants from the south. Then all pass northward.

88. **Polyborus cheriway.** AUDUBON'S CARACARA. — Very common resident. I think some pass the winter further south, as they seem more numerous in summer than in winter. Breeds from February until June. Nest in chaparral and small trees on prairie; rarely in edge of timber; never, I think, in the woods. Local name, 'Mexican Buzzard'; called by the Mexicans, 'Totache.'

89. **Pandion haliaëtus carolinensis.** AMERICAN OSPREY. — Not common. In fact I have seen only one in the county, Nov. 25, 1899, on St. Charles Bay. Natives tell me that they are not as common as formerly, and that they once bred here. Local name, 'Fish Hawk.'

90. **Strix pratincola.** AMERICAN BARN OWL. — Not common. Found one frozen during the winter of 1897–98. Formerly bred in caves in arroya banks. Possibly they do yet, but I have not found them so doing.

91. **Asio accipitrinus.** SHORT-EARED OWL. — Saw a single specimen in the spring of 1899.

92. **Syrnium nebulosum helveolum.** TEXAN BARRED OWL. — Tolerably common resident in all parts of the county, especially so in the bottoms of the San Antonio River. Breeds in March.

93. **Megascops asio mccalli.** TEXAN SCREECH OWL. — Rather rare. Have seen but few. Breeds in March and April.

94. **Bubo virginianus pallescens.** WESTERN HORNED OWL. — Very common resident. Adopts the nests of Buteos and Caracaras. Breeding begins in January. Have found their nests far out in the prairie in small mottes, miles from timber.

95. **Speotyto cunicularia hypogæa.** BURROWING OWL. — Very com-

mon during the winter months, though I think none remain to breed. Have been told that they do, but I doubt it.

96. **Geococcyx californianus.** ROADRUNNER. — Observations made in every part of the State where the Roadrunner occurs convince me that in this and counties contiguous, it is commoner than in any other section. Breeds from March until June, possibly later, in chaparral, cactus and small trees. Local name, 'Chaparral Bird'; Mexican name, 'Paisano.'

97. **Coccyzus americanus.** YELLOW-BILLED CUCKOO. — Common summer resident. In spring of 1899 arrived April 18. Breeds in May and June. Sets of five eggs not uncommon.

98. **Ceryle alcyon.** BELTED KINGFISHER. — Rather uncommon resident. A few seen along the Arroyos Medio and Blanco. Breeds in the high banks of the Blanco.

99. **Dryobates scalaris bairdi.** TEXAN WOODPECKER. — Much the commonest of the Picidæ. Occurs commonly in prairie mottes, in deep woods, and trees along streams. Nests early, making the excavation in the small dead branches of trees, usually near the top, or in fence-posts. Local name, 'Speckle-check.'

100. **Melanerpes erythrocephalus.** RED-HEADED WOODPECKER. — Rare winter resident. Have seen only one, — the latter part of November, 1899.

101. **Melanerpes aurifrons.** GOLDEN-FRONTED WOODPECKER. — This species and *D. s. bairdi*, so far as my knowledge goes, are the only resident Woodpeckers in the county. Not so common as the above mentioned species. Breeds in dead stubs in April.

102. **Colaptes auratus.** FLICKER. — Rare migrant. The only bird noted was a single male, March 17, 1899.

103. **Antrostomus carolinensis.** CHUCK-WILL'S-WIDOW. — Tolerably common migrant. In 1899, arrived March 17. Think possibly some remain the entire winter.

104. **Nyctidromus albicollis merrilli.** MERRILL'S PARAUQUE. — Not common. Breeds sparingly. Local name, 'Whip-poor-will.'

105. **Chordeiles virginianus henryi.** WESTERN NIGHTHAWK. — Very common summer resident. In 1899, arrived April 14. Breeds commonly on the prairies in May and June. Local name, 'Bull-bat.'

106. **Chordeiles acutipennis texensis.** TEXAN NIGHTHAWK. — Not so common as *C. v. henryi.* In 1899, arrived April 11. Breeds.

107. **Chætura pelagica.** CHIMNEY SWIFT. — Common migrant. In 1899, arrived April 4.

108. **Trochilas colubris.** RUBY-THROATED HUMMINGBIRD. — Very common during migrations. In 1898, arrived March 25; in 1899, March 13. Some remain throughout the summer, though I have never found a nest here.

109. **Trochilus alexandri.** BLACK-CHINNED HUMMINGBIRD. — Common during migrations. In 1899 it arrived April 11.

110. **Milvulus forficatus.** SCISSOR-TAILED FLYCATCHER. — Abundant

summer resident. In 1898, arrived March 12; in 1899, March 13. Breeds in great numbers in the chaparral and prairie mottes. Local name, 'Spanish Mockingbird.'

111. **Tyrannus tyrannus.** KINGBIRD. — Very common in migration seasons. Quite a number remain throughout the summer. For ten or twelve years, a pair of Kingbirds have placed their nest in the same tree, on the identical spot on the same branch, each successive year. Is it the same pair each year? In 1899, arrived April 7.

112. **Myiarchus crinitus.** CRESTED FLYCATCHER. — Rare summer resident. Much more common during migrations. In 1898, arrived March 30; in 1899, March 13.

113. **Sayornis phœbe.** PHŒBE. — Not a very common migrant.

114. **Contopus virens.** WOOD PEWEE. — Very abundant during migrations. In 1899, arrived April 17.

115. **Otocoris alpestris giraudi.** TEXAN HORNED LARK. — Tolerably common. Seems to have great attachment for certain localities. At a certain point on the road about four miles from the Refugio Mission, I seldom fail to find them. Breeds in May.

116. **Corvus americanus.** AMERICAN CROW. — A few frequent the bottoms of the San Antonio River.

117. **Molothrus ater.** COWBIRD. — Common winter resident; associating with *Quiscalus macrourus* and *Scolecophagus cyanocephalus.*

118. **Molothrus ater obscurus.** DWARF COWBIRD. — Very common. Imposes upon the Lark Sparrow more frequently than on any other bird.

119. **Xanthocephalus xanthocephalus.** YELLOW-HEADED BLACKBIRD. — Very rare. Saw one in winter of 1895–96.

120. **Agelaius phœniceus.** RED-WINGED BLACKBIRD. — Common resident. Breeds in prairie ponds in company with *Quiscalus macrourus,* in May and June.

121. **Sturnella magna.** MEADOWLARK. — Tolerably common summer resident, breeding in May.

122. **Sturnella magna neglecta.** WESTERN MEADOWLARK. — Abundant winter resident and a great destroyer of corn crops at planting time.

123. **Icterus spurius.** ORCHARD ORIOLE. — Very common during migrations. In 1899, arrived April 11. Few remain to breed, placing their nests in mesquite trees near the coast.

124. **Icterus galbula.** BALTIMORE ORIOLE. — Tolerably common migrant. In 1899, arrived April 15.

125. **Icterus bullocki.** BULLOCK'S ORIOLE. — Rather rare summer resident. Breeds in May.

126. **Scolecophagus carolinus.** RUSTY BLACKBIRD. — A good many seen during migrations. In 1899, arrived March 3.

127. **Scoleocophagus cyanocephalus.** BREWER'S BLACKBIRD. — One of the most abundant winter residents; seen much in company with *Quiscalus macrourus.* Remains until late spring.

128. **Quiscalus quiscula æneus.** BRONZED GRACKLE. — Common in migration season. In 1899, arrived March 3. Found a few pairs breeding with the colony of *Q. macrourus* in June, 1898.

129. **Quiscalus macrourus.** GREAT-TAILED GRACKLE. — Abundant at all times. A common pest. Breeds in immense colonies in May and June. Nests placed in small trees in prairie mottes or in weeds in ponds, about three to five feet above water. Local name, 'Jackdaw.'

130. **Pocecetes gramineus confinis.** WESTERN VESPER SPARROW. — Tolerably common.

131. **Ammodramus sandwichensis.** SAVANNA SPARROW. — Not very common. One taken April 2, 1898.

132. **Ammodramus savannarum perpallidus.** WESTERN GRASSHOPPER SPARROW. — Rare summer resident. Nest containing five fresh eggs was found in May, 1898.

133. **Ammodramus maritimus sennetti.** TEXAN SEASIDE SPARROW. — Rather rare, occurring sparingly along the bays.

134. **Chondestes grammacus.** LARK SPARROW. — Very common. summer resident. Arrived in 1899, March 15. Nests indiscriminately on the ground, in chaparral or in small trees.

135. **Zonotrichia leucophrys.** WHITE-CROWNED SPARROW. — Tolerably common winter resident. Associates with *Spizella pallida*.

136. **Spizella pallida.** CLAY-COLORED SPARROW. — Common winter resident.

137. **Spizella pusilla.** FIELD SPARROW. — Common winter resident.

138. **Junco hyemalis.** SLATE-COLORED JUNCO. — A few seen in winter. Not common.

139. **Peucæa cassini.** CASSIN'S SPARROW. — Tolerably common. Breeds in April and May.

140. **Melospiza lincolni.** LINCOLN'S SPARROW. — Common during migrations. In 1899, arrived March 14.

141. **Cardinalis cardinalis canicaudus.** GRAY-TAILED CARDINAL. — Common resident. Breeds in April, May, and June.

142. **Pyrrhuloxia sinuata.** TEXAN CARDINAL. — Not common. Breeds sparingly.

143. **Cyanospiza cyanea.** INDIGO BUNTING. — Common migrant. In 1899, arrived April 15.

144. **Cyanospiza ciris.** PAINTED BUNTING. — Rather uncommon summer resident. Breeds in May. In 1899, arrived April 17.

145. **Spiza americana.** DICKCISSEL. — Very common migrant. Do not think any remain to breed. In 1899, arrived April 15.

146. **Calamospiza melanocorys.** LARK BUNTING. — Very common winter resident. Gregarious. Frequents the chaparral.

147. **Piranga rubra.** SUMMER TANAGER. — Rather scarce migrant. In 1899, arrived April 17.

148. **Progne subis.** PURPLE MARTIN. — Rather common summer resident. In 1899, arrived April 6.

149. **Petrochelidon lunifrons.** CLIFF SWALLOW. — Common migrant. In 1899, arrived March 25.

150. **Hirundo erythrogastra.** BARN SWALLOW. — Very common during migrations. In 1899, arrived April 27.

151. **Tachycineta bicolor.** TREE SWALLOW. — Very common migrant. In 1899, arrived March 30.

152. **Stelgidopteryx serripennis.** ROUGH-WINGED SWALLOW. — Common migrant.

153. **Ampelis cedrorum.** CEDAR WAXWING. — Two flocks containing several hundred individuals each were seen February 27, 1899.

154. **Lanius ludovicianus excubitorides.** WHITE-RUMPED SHRIKE. — Very common in winter, frequenting the chaparral. None remain to breed.

155. **Vireo olivaceus.** RED-EYED VIREO.—Tolerably common migrant. In 1899, arrived April 4. Others were seen on the 17th.

156. **Vireo flavifrons.** YELLOW-THROATED VIREO. — Rather uncommon migrant. In 1898, arrived Apr. 1; in 1899, Apr. 11.

157. **Vireo noveboracensis.** WHITE-EYED VIREO. — Common during migrations. In 1899, arrived March 15. Rare summer resident, breeding in May.

158. **Vireo bellii.** BELL'S VIREO. — Tolerably common migrant. Rare summer resident, breeding in April.

159. **Mniotilta varia.** BLACK AND WHITE WARBLER. — Common migrant. In 1898, arrived March 31; in 1899, March 13.

160. **Compsothlypis americana.** PARULA WARBLER. — Very abundant migrant. In 1899, arrived March 13; another wave April 15.

161. **Dendroica æstiva.** YELLOW WARBLER. — Usually a tolerably common migrant. Failed to observe any in 1899.

162. **Dendroica coronata.** MYRTLE WARBLER.—Very common migrant. In 1899, arrived March 13; a few more were seen on April 15.

163. **Dendroica maculosa.** MAGNOLIA WARBLER. — Rather uncommon migrant. In 1898, arrived May 14.

164. **Dendroica blackburniæ.** BLACKBURNIAN WARBLER. — Rather uncommon migrant. Arrived in 1899, March 13; another wave April 17.

165. **Dendroica dominica albilora.** SYCAMORE WARBLER. — Uncommon migrant. In 1899, arrived March 13; a few more April 15.

166. **Dendroica virens.** BLACK-THROATED WARBLER.—Tolerably common migrant. In 1899, arrived April 17.

167. **Seiurus noveboracensis.** WATER-THRUSH. — Common migrant. In 1899, arrived April 15.

168. **Seiurus motacilla.** LOUISIANA WATER-THRUSH. — An uncommon migrant. In 1899, arrived March 17.

169. **Geothlypis trichas.** MARYLAND YELLOW-THROAT. — Common migrant. In 1899, arrived April 15.

170. **Icteria virens.** YELLOW-BREASTED CHAT. — Migrant. Not common. In 1899, arrived April 11.

171. **Wilsonia mitrata.** HOODED WARBLER. — Common migrant. In 1898, arrived March 30; in 1899, March 13.

172. **Setophaga ruticilla.** AMERICAN REDSTART. — Common migrant. In 1899, arrived April 15.

173. **Oroscoptes montanus.** SAGE THRASHER. A few seen in winter.

174. **Mimus polyglottos.** MOCKINGBIRD. — Abundant resident. Breeds in the chaparral and small trees in prairie mottes, in April, May, and June.

175. **Galeoscoptes carolinensis.** CATBIRD. — Common migrant.

176. **Harporhynchus curvirostris.** CURVE-BILLED THRASHER. — Uncommon summer resident. Breeds in May.

177. **Thryothorus bewickii bairdi.** BAIRD'S WREN. — Tolerably common resident.

178. **Parus bicolor texensis.** TEXAN TUFTED TITMOUSE. — Very common.

179. **Parus carolinensis agilis.** PLUMBEOUS CHICKADEE. — Not common.

180. **Auriparus flaviceps.** VERDIN. — Uncommon summer resident.

181. **Polioptila cærulea.** BLUE-GRAY GNATCATCHER. — Common winter resident. Reinforced March 13, 1899, by migrants from the south. Does not remain through the summer.

182. **Hylocichla mustelina.** WOOD THRUSH. — Common migrant. In 1899, arrived April 17.

183. **Hylocichla fuscescens.** WILSON'S THRUSH. — Not a very common migrant. In 1898, arrived May 12. Saw none in 1899.

184. **Merula migratoria.** ROBIN. — In severe seasons, a common winter resident. When the winters are mild, none or very few are present.

185. **Sialia sialis.** BLUEBIRD. — A few spend the winter.

THE BIRDS OF CAPE DISAPPOINTMENT, WASHINGTON.

BY WILLIAM H. KOBBÉ.

THE following birds were collected by me upon Cape Disappointment during the first six months of 1898, although my notes and observations extend over a much longer period. All the birds enumerated in the list are now in my collection, with the exception of those mentioned as being identified by other means.

For a fuller and more complete introduction I beg the reader to refer to my article upon the Rufous Hummingbird in the January number of 'The Auk' for this year. By so doing a better idea of the general aspect, climate, vegetation, etc., of the cape might be gained.

1. **Æchmophorus occidentalis**. WESTERN GREBE. — This species is abundant throughout the winter months, arriving soon after the rainy season begins in September or October and departing in March or April. It was the only species of Grebe found by me upon the cape and much preferred the bay to the fresh water lake formed by the heavy rains.

2. **Gavia lumme**. RED-THROATED LOON. — One specimen of this species was killed by me on Feb. 8, 1898. Upon skinning, it proved to be a female in immature plumage. Although this is the only specimen of any Loon in my collection, shot upon the cape, I am certain that other species occur there in abundance. I have seen a great many Loons upon the bay and have good reasons for believing them to be in all probability *Gavia pacifica* (Pacific Loon).

3. **Larus occidentalis**. WESTERN GULL. — The Western Gull is exceedingly abundant during the winter, and although I have frequently seen individuals during the summer, they are not at all common at that time of year. Doubtless other species occur upon the cape, but I have never shot any.

4. **Puffinus griseus**. DARK-BODIED SHEARWATER. — Very rare. One specimen of this bird was killed on May 6, 1898. It was an adult female and the following entry was made in my notes concerning it: "*Puffinus griseus*. Killed on May 6, 1898, at Fort Canby, Wash., mouth of the Columbia River. Sex and age: ♀ ad. Measurements and colors: 18⅜ × 41½ × 12 inches. Eyes very dark yellowish brown, almost black; bill dusky bluish horn color, blackening along culmen; toes and tarsi bluish. This specimen was given to me by a surfman of the U. S. Life Saving

Crew at this place, who killed it with an oar, after driving it up against a fish net." This species is said to be abundant near Tillamook lighthouse, which is about twenty miles south of Cape Disappointment.

5. **Phalacrocorax dilophus cincinatus.** WHITE-CRESTED CORMORANT. — This Cormorant is a very abundant species during the entire year, but especially so in the winter and spring. They are rather wary birds to hunt, but may always be shot while sitting upon the stakes which support the fish pots. They sometimes perch upon these poles for hours and oftentimes may be seen with their wings half spread, by which means they dry them. Although the birds remain throughout the summer, I did not find them nesting upon the numerous cliffs of the cape and am certain they do not breed in this locality. This species is without doubt the one referred to by Mr. R. H. Lawrence in his list of birds of Gray's Harbour which appeared in 'The Auk,' Vol. IX, 1892, p. 353.

6. **Phalacrocorax pelagicus robustus.** VIOLET-GREEN CORMORANT. — The Violet-green Cormorant is only found upon the cape during the winter months, when it is very abundant. It arrives in the fall and departs rather late in the spring. During its stay upon the cape it associates with the White-crested Cormorant and the two species may often be seen perched upon the fish-trap poles in large flocks. Both species frequently fly into the fish pots from which they are unable to escape, since they are unable to fly vertically upward. It is an easy matter for the birds to fly from the poles downward into the square pot formed of netting, but after they once get in they are forced to remain and are generally killed by the fishermen.

7. **Merganser serrator.** RED-BREASTED MERGANSER. — Rare. Only two specimens shot during fall migration of 1897.

8. **Anas boschas.** MALLARD. — Not abundant. A few flocks occasionally seen upon the lake during migrations.

9. **Nettion carolinensis.** GREEN-WINGED TEAL. — Rare. One specimen killed by me out of a flock of three driven upon the ocean beach by a severe storm. This was during the winter.

10. **Dafila acuta.** PINTAIL. — This species is sometimes seen upon the lake, but very rarely and then only during the winter.

11. **Aythya vallisneria.** CANVAS-BACK. — This is the only species of the subfamilies Anatinæ and Fuligulinæ which may be said to really inhabit the cape, with the exception of the Scoters (*Oidemia*). The Canvas-backs arrived in November, 1897, and remained until the following March. There were immense flocks of them upon the bay, but after a few months they became very 'fishy' and unfit for the table.

12. **Oidemia perspicillata.** SURF SCOTER. — A very abundant species. One of the first Ducks to arrive in September and the last to leave in April. Feeds extensively on mussels and always swallows the shells, some of them being empty or else filled with mud. When rowing upon the bay on a bright, or at least not a stormy day, large flocks of these Ducks are often frightened at the approach of the boat and take to wing,

only to settle a short distance ahead. Upon these occasions the loud whistling of their rapid wing beats can be heard a long distance — a half mile or more if the weather is very calm.

13. **Oidemia deglandi.** WHITE-WINGED SCOTER. — This species associates in large flocks with *Oidemia americana*, and all statements made concerning the latter will apply equally well to *Oidemia deglandi*.

14. **Ardea herodias.** GREAT BLUE HERON. — Not abundant. This species is sometimes seen in the fall of the year, but its scarcity is quite natural since the cape is not at all suited to its wants. The individuals seen by me were either perched upon the fish-trap poles or else wading in the lake.

15. **Fulica americana.** AMERICAN COOT. — Very rare. Occasionally seen upon the lake in the fall of the year.

16. **Gallinago delicata.** WILSON'S SNIPE. — During the fall of the year this species is sometimes abundant and at other times rare. There is only a very small marsh upon the cape where they are to be found and which is hardly suited to the habits of the species.

17. **Numenius hudsonicus.** HUDSONIAN CURLEW. — Very rare. The cape being very rocky and densely wooded, it is no wonder that this bird is rare. The only two seen by me were shot on May 18, 1898, and both were females, found upon a grassy headland of about four acres in area. The stomachs of the birds contained a quantity of beetle-like insects.

18. **Dendragapus obscurus fuliginosus.** SOOTY GROUSE. — It would be hard to say whether this species is abundant or not owing to the character of the country. All that I can say, however, is that I have only seen one specimen, which I killed. This was on May 17, 1898, and upon dissection the specimen proved to be a female, her oviduct containing an egg upon which the coloring matter had not been deposited.

19. **Bonasa umbellus sabini.** OREGON RUFFED GROUSE. — Not abundant; although with a sufficient amount of labor these birds can be found. It took me nearly a month to become well enough acquainted with their habits to obtain even one or two a week.

These Grouse are only found upon the cape during the fall, and the utmost care must be exercised in hunting them. They are extremely fond of the small wild crab apples (*Pyrus rivularis*) which grow in the low, damp woods. The birds visit these trees very early in the morning and late in the evening, at which times they may be found silently perched upon the branches. As they generally hear you approaching before you discover them, they are nearly always seen in a motionless attitude, ready to fly at the slightest sound. It often happens that the first intimation a hunter has of the presence of a Grouse is a startling commotion among the branches overhead, the rapid whir of wings and the bulky form of the bird as it hurls itself through the woods!

20. **Columba fasciata.** BAND-TAILED PIGEON. — This Pigeon is only seen on the cape when the salmon berries (*Rubus nutkanus*) ripen in June and July. They are then seen in large flocks, but are difficult to shoot

since they penetrate the densest woods in search of the berries. They also perch in the highest spruces and keep well out of range. I have been told that they also frequent the wheat fields in the vicinity of Ilwaco, Pacific Co., Wash.

21. **Falco columbarius suckleyi.** BLACK MERLIN. — Only one specimen of this Falcon was seen by me, and that was killed on April 23, 1898, and proved to be an adult female. Stomach contained portions of several small birds.

22. **Megascops asio kennicottii.** KENNICOTT'S SCREECH OWL. — Quite rare. Two specimens killed on June 30, 1898, — one, an adult female in the brown phase, and the other a female in the downy stage. The birds were found together in a dark ravine where the brood had probably been raised. The stomachs of both contained a quantity of grubs.

23. **Ceryle alcyon.** BELTED KINGFISHER. — The Belted Kingfisher arrived at the cape on March 23, 1898, and remained abundant all through the summer. They are never seen during the winter, but in summer can be found anywhere along the rocky shores of the bay. In all probability the species breeds upon the cape, as I have seen many disused tunnels in the clay banks. Before eating a fish I have seen the birds kill their prey by striking it against the limb upon which they were sitting.

24. **Dryobates villosus harrisii.** HARRIS'S WOODPECKER. — This Woodpecker is fairly abundant during the summer months; but it is a rather wild and wary bird, hard to shoot and harder to find afterwards in the thick brush of the fir woods which it inhabits. I have but two specimens in my collection. Both have the smoky under parts, and the dates of collecting were May 18 and June 5, respectively.

25. **Dryobates pubescens gairdnerii.** GAIRDNER'S WOODPECKER. — This small species of Woodpecker is fairly abundant during the fall and winter months, but becomes very scarce as spring merges into summer. Harris's Woodpecker now takes its place, so that the two species do not occur together upon the cape. When Gairdner's is common, Harris's is rare, and *vice versa*. Gairdner's Woodpecker may often be seen in small trees, such as alders, willows, etc., while its larger cousin is generally found in the dark fir woods, hammering upon the giant trunks. I did not find either species breeding.

26. **Melanerpes torquatus.** LEWIS'S WOODPECKER. — Very rare. Only one specimen seen by me during my entire stay upon the cape. This was killed by me on April 30, 1898, and proved to be an adult male in fine plumage. This individual was remarkably tame and was seen perched in the top of a low fir tree directly in front of the house, where it would sit for a few minutes and then fly into the air after an insect, very much in the same manner as a Flycatcher.

27. **Colaptes cafer saturatior.** NORTHWESTERN FLICKER. — The Northwestern Flicker is fairly abundant during the entire year, but especially so in the fall and spring. I think it is a wilder and more wary bird than

its southern representative, *Colaptes cafer*, and its note is louder and more ringing. Although I have never found its nest, in all probability the species breeds upon the cape, since I have found many deserted holes. These were generally placed in rotten tree trunks from fifteen to thirty feet above the ground.

28. **Trochilus rufus.** RUFOUS HUMMINGBIRD. — This species is one of the most abundant birds found upon the cape. The cape swarms with them from the first part of March until September. They nest very early — about April 20 or 25, you may look for eggs. The majority of the nests are placed in thick fir trees and are built directly upon a horizontal bough, the needles of which often penetrate the bottom of the nest. This seems to be the only defect in the most perfect and beautiful of bird structures! It is, however, not such a common condition as I may have led you to suppose. About one nest in six or eight is thus defective.

29. **Sayornis saya.** SAY'S PHŒBE. — During my stay upon the cape I saw but one specimen of this species, which I shot on June 1, 1898. It was an adult male and I quote the following lines from my notes concerning this individual. "I found this bird upon the ocean beach among the drift wood. It was extremely wild and wary and would keep just out of range, flying from log to log as I approached. I was finally able to kill it by crawling on my hands and knees to a big log which concealed me." The cape is an ideal place for *Contopus borealis*, but a very poor one for this species.

30. **Contopus borealis.** OLIVE-SIDED FLYCATCHER. — This species is most abundant throughout the summer. That is abundant for a bird as comparatively rare as is the Olive-sided Flycatcher. They arrive very early in May, the males preceding the females about one month, and remain until late summer or fall. During the month of May, 1898, I killed fifteen specimens and saw twice as many more, which is good proof of their abundance. Although plentiful they are rather difficult to shoot, their favorite perches being the tallest pines and spruces. Their penetrating notes resound through the dark fir woods during the long days of summer, being the only sound which breaks a death-like silence. The notes, which are whistled shrilly, are something like this: *Whe-whe-whea*, uttered rather quickly and repeated twice. After repeating these notes four or five times, they whistle *whet-we-wea*, an interval being between the first and the last two, which are sounded close together.

In all probability this Flycatcher breeds upon the cape, but their nests are next to impossible to find.

31. **Contopus richardsoni.** WESTERN WOOD PEWEE. — Not so abundant as the last, but often seen associated with it and catching insects in the same tree. This species arrives soon after *Contopus borealis*, and remains about the same length of time. Probably breeds on the cape.

32. **Cyanocitta stelleri.** STELLER'S JAY. — This Jay is very abundant in the fall and spring, but exceedingly scarce in winter, only one pair remaining on the cape through the winter of 1897–98. During the fall I

once counted twenty-five of these Jays all in sight at one time. Although rather tame they possess a remarkable amount of sagacity and well know when they are being hunted. They are very noisy birds and may often be seen mounting a giant spruce tree, limb by limb, ascending spirally about the trunk until the topmost branch is reached. They often do this when being pursued, and since they seldom pause until the top is reached, it takes a quick shot to bring one down.

Although the birds from Cape Disappointment are without doubt Steller's Jays, Mr. Leverett M. Loomis of the California Academy of Sciences pronounced them to be an intermediate form and not as typical *Cyanocitta stelleri* as is the Alaskan form.

The species is one of the most characteristic and interesting found upon the cape and may possibly nest there.

33. **Corvus americanus.** AMERICAN CROW. — Quite abundant during the entire year. But I hardly think that it is as abundant as *Corvus caurinus*, which is a very common bird on the cape. *Corvus americanus* associates with *C. caurinus* in large flocks, and probably breeds upon the cape.

34. **Corvus caurinus.** NORTHWEST CROW. — This Fish Crow is abundant on the cape during the entire year, and is generally to be found in large flocks, inhabiting the wooded shores of the bay. The birds are very maritime in their habits and feed principally upon the beaches, where they pick up shellfish, crabs and refuse washed up by the waves. After being once shot at they become exceedingly wild and wary and difficult to approach. They nest upon the cape in spruces.

35. **Agelaius phœniceus.** RED-WINGED BLACKBIRD. — Not abundant. This species, together with the next, arrives about March 1 and remains throughout the summer. These birds are rather hostile towards their western representative, the Bicolored Blackbird, and frequently drive the latter from the small marsh which they are both forced to inhabit. Some of the specimens shot by me are typical of the species. Although I found no nests, they doubtless breed upon the cape.

36. **Agelaius gubernator californicus.** BICOLORED BLACKBIRD. — More abundant than the preceding, with which it is closely associated; the same remarks applying to both.

37. **Carpodacus purpureus californicus.** CALIFORNIA PURPLE FINCH. — These beautiful Finches arrive at the cape early in March and remain abundant throughout the summer. They breed upon the cape, and one of the finest nests in my collection was built by this Finch entirely of straight fir twigs, which causes it to be rather triangular in form. It is lined with horsehair.

38. **Spinus tristis.** AMERICAN GOLDFINCH. — In 1898 these Goldfinches arrived at the cape on April 25, and in a few weeks became quite abundant. They breed upon the cape and depart in early fall. Their nests may be looked for in May and June and are generally built in deciduous trees, in most cases being placed in a fork. However, I observed

one nest which was placed upon the drooping branch of a fir tree. The sprightly ways and twittering song of this beautiful bird are so well known that I will forbear further description of its habits.

39. **Ammodramus sandwichensis.** SANDWICH SPARROW. — I observed this species for the first time upon the cape on April 20, 1898, when a small flock was seen on the grassy headland where I had previously shot the Hudsonian Curlew. This headland is the only spot on the entire cape at all suited to the habits of ground birds.

The Sandwich Sparrows, however, remained upon it until the middle of May when they suddenly disappeared. Doubtless the flock was on its northward migration and must be considered as an unusual occurrence on the cape. Dr. Coues very kindly examined a specimen for me from this flock and pronounced it typical of the species. After being hunted a short time the birds became very wild and would flush from the grass quite out of range. They have often led me into dangerous places by flying down the sides of the headland and alighting in the stunted grass which grows upon the rocky sides only a short distance above the breakers. They seemed to know that by going into such places they stood a better chance of escaping.

40. **Zonotrichia gambeli.** GAMBEL'S SPARROW. — This species arrives on Cape Disappointment about the middle of April and remains rather scarce throughout the season. I think the cape is too heavily wooded for it to become abundant. I discovered the birds breeding in the summer of 1897 upon the windy headlands, their nests being placed deep in the hearts of thick spruces to protect them from the strong winds.

I have often seen this handsome Sparrow perched upon the top of a young spruce, its plaintive song rising above the roar of the ocean while the wind almost blew it from its swaying perch.

41. **Zonotrichia coronata.** GOLDEN-CROWNED SPARROW. — This species arrives with *Zonotrichia gambeli* but is rather less abundant and does not nest upon the cape. The birds are extremely fat and the most difficult to skin of any Sparrows I have ever prepared. These birds seem to be more at home in the woods than Gambel's Sparrow.

42. **Junco hyemalis oregonus.** OREGON JUNCO. — Abundant throughout the year with the exception of summer, when it is not seen upon the cape. A large flock of these birds inhabited a manure field during the whole winter of 1897–98. They leave the cape in early summer.

43. **Melospiza fasciata guttata.** RUSTY SONG SPARROW. The Rusty or Oregon Song Sparrow is a most abundant bird upon the cape at all seasons of the year, and their cheerful songs help very much to cheer the rainy winters. The birds inhabit the thick underbrush in countless numbers and may be readily called out by chirping. They breed upon the cape, but their nests are most difficult to find. The following is a description of one taken on July 1: "The nest was situated on the horizontal branch of a small spruce tree about five feet from the ground. It is composed entirely of very coarse grass stems and is lined with fine

grass. The parent bird could seldom be seen upon the nest owing to its extreme wariness. In fact I never once succeeded in approaching near enough to the nest to see the bird as she sat upon it. I was only able to accomplish this by waiting in a thick clump of brush which concealed me, until she returned to the nest. This nest measured as follows: Diameter outside, 5 in.; diameter inside, 3 in.; depth outside, 3½ in.; depth inside, 2 in.

44. **Passerella iliaca unalaschcensis.** TOWNSEND'S SPARROW. — This large Sparrow is found on the cape during the entire year with the exception of summer. They are rather less abundant than the Rusty Song Sparrows and are more retiring in their habits. They are much oftener heard scratching in the brush than seen and are difficult to shoot for that reason.

45. **Pipilo maculatus oregonus.** OREGON TOWHEE. — For some unaccountable reason this bird is extremely rare upon the cape. During my entire stay I killed but one specimen. This was a female killed on March 5, 1898. Being a brush inhabiting bird it is possible that they do occur upon the cape; but it must be said that they are extremely rare and would certainly have been discovered by me if at all plentiful.

46. **Hirundo erythrogaster.** BARN SWALLOW. — This Swallow arrives very early in April and remains very abundant throughout the summer, adding very much to the natural beauty of the cape. Since they are not disturbed the birds become very tame and nearly every house in the garrison has its Swallow's nest over the front porch. These are generally placed in a corner or on a projecting cornice or post top.

47. **Tachycineta bicolor.** TREE SWALLOW. — Rare. In 1898 a few of these birds were seen in May. Shot one specimen.

48. **Clivicola riparia.** BANK SWALLOW. Very rare. In May, 1897, while searching the island near the end of the cape I found a nest of this species containing a full set of eggs. This is the only time I met with the species upon the cape.

49. **Petrochelidon lunifrons.** CLIFF SWALLOW. — Quite a number of these birds were seen in the summer of 1898 and one was shot and indentified. I also observed many Swallows nesting in the caves on the ocean side of the cape which were probably referable to this species. It was impossible to identify them, since the caves were almost pitch dark, and the birds mounted high in air as soon as they left them.

50. **Ampelis cedrorum.** CEDAR WAXWING. — Rare. Three of these handsome birds were seen upon the cape in the middle of June, 1898, and one pair remained to build their nest. This is the only time they were seen upon the cape.

51. **Helminthophila celata lutescens.** LUTESCENT WARBLER. — This is one of the first Warblers to arrive, early in April, and it remains one of the most abundant birds throughout the summer. On April 29, 1898, I found a nest of this species containing five fresh eggs, and situated in a small cavity in a grassy bank. The cavity was only a slight hollow

formed by an overhanging clump of fern and was an ideal spot for a bird's home. All the nests found by me (five or six) were thus placed in green banks.

52. **Dendroica auduboni.** AUDUBON'S WARBLER. — Abundant throughout the summer and nests upon the cape. A nest taken by me on June 27, 1898, was placed on the horizontal bough of a spruce tree forty feet from the ground, and six feet from the trunk of the tree. The nest could only be seen from above and was discovered by seeing the parents build it.

53. **Wilsonia pusilla pileolata.** PILEOLATED WARBLER.— Fairly abundant in summer but not nearly so plentiful as the two preceding species. I found a nest of this Warbler on June 15, 1898, which was placed in the center of a large clump of fern growing in some low damp woods. It contained three young birds and one addled egg, and was quite bulky, being 6½ inches in outside diameter and 4½ inches in outside depth.

54. **Thryomanes bewickii spilurus.** VIGORS'S WREN. — This Wren is exceedingly rare upon the cape. One male specimen was killed by me on May 26, 1898, — the only one ever seen.

55. **Anorthura hiemalis pacificus.** WESTERN WINTER WREN. — A common resident of the cape and seen at all seasons of the year. It is, however, a very retiring bird and is not often shot. Nests upon the cape and is a good songster.

56. **Parus atricapillus occidentalis.** OREGON CHICKADEE. — This sprightly little bird is abundant during the winter but very rare in summer. I find nothing in my notes concerning it.

57. **Parus rufescens.** CHESTNUT-BACKED CHICKADEE.— Quite abundant during the entire year but especially so in winter. The birds nest upon the cape and I found one on May 20, 1898, built in a hollow twenty-one feet from the ground and containing seven eggs. For a complete description of this nest, see 'Bulletin Cooper Ornithological Club,' Vol. I, No. 5, pp. 84–85.

58. **Regulus satrapa olivaceus.** WESTERN GOLDEN-CROWNED KINGLET. — This species is abundant throughout the winter but does not occur upon the cape at any other season.

59. **Regulus calendula.** RUBY-CROWNED KINGLET. — This species associates with the last and is also frequently seen with *Parus rufescens.* They are abundant birds throughout the winter.

60. **Hylocichla ustulatus.** RUSSET-BACKED THRUSH.— These Thrushes do not arrive on the cape until April or May, when they become exceedingly abundant, their low whistle being heard on all sides. Their nests may be found by the hundreds in the low damp woods and are nearly always placed in alders. The first nest found in 1898 was on June 14.

61. **Merula migratoria propinqua.** WESTERN ROBIN. — These birds are only absent from the cape during the height of the rainy season —

December, January and February. At all other seasons they are most abundant and their nests are very plentiful.

62. **Hesperocichla nævia.** VARIED THRUSH. — The Varied Thrush or Oregon Robin is a very common bird during the winter, but departs to its breeding grounds with the advent of spring. In habits it is much like the common Robin.

63. **Sialia mexicana.** WESTERN BLUEBIRD. — Very rare. Only one specimen of this bird was ever seen by me upon the cape. This was an immature female killed April 5, 1898.

In conclusion I wish to state that I have attempted to describe the bird life of the cape just as I saw it, and for the purpose of relieving the monotony of mere dates have included some of the most prominent habits of the birds as seen by me. I also wish to say that there were some birds not identified by me, which occur upon the cape, such as the larger Hawks and Eagles, and also the shore birds, which are entirely absent from the list for want of proper identification. All specimens in my collection whose identification was uncertain were compared with specimens in the collection of the California Academy of Sciences, and Mr. Loomis also very kindly examined certain birds for me.

NESTING HABITS OF THE CERULEAN WARBLER.

BY W. E. SAUNDERS.

SOME years ago, while on a short walking trip through the western peninsula of Ontario, I located a woods in which the Cerulean Warbler (*Dendroica cærulea*) was exceedingly common. Ever since, I have wished for an opportunity to visit that locality in early May that I might make their acquaintance in the housekeeping season and perhaps get a few nests. Near London, only 60 or 70 miles farther east, they average uncommon, and near Toronto they are seldom seen.

On May 16, 1900, I got back near the place and in a day's hunt succeeded in finding two pieces of woodland where they were common, and though there appeared to be as yet no sign of nest

building, the prospects were so favorable that I determined to visit the place again at a later date. In the meantime I found a pair near London, and after a short watch saw the female at work on the nest, which was then just begun, and could hardly be seen from the ground for leaves, though only seventeen feet up on a sloping limb of a basswood. By the 24th it was apparently finished but no bird was near, nor were they to be seen on the 28th, and on June 2nd, when the ascent was made, the nest was found completed but empty. It was situated on a limb two and one half inches in diameter just beside a vertical twig, but not held in place by anything except its own fibres attaching it to the main branch.

On June 4, accompanied by Mr. H. Gould, I made the western trip again, and after walking the necessary seven miles that evening we set the alarm clock for before daylight and turned in. Next morning we were in the woods long before five, and found, as before, many Ceruleans in full song, and immediately set to work, thinking we had easy work before us. But when, after two or three hours of steady work we met, and found that the total result was one nest building, we began to fear, and by ten o'clock were ready to give up.

We then spent an hour or two in another woods, but came back to lunch on the scene of our disappointment, and while eating we noticed a female, leisurely feeding and hopping around in a tree in front of us. By the time we were ready to move, she had covered two or three trees so often that we felt sure her nest was in one of them and we got on opposite sides of the clump of trees to watch her. Then it began to dawn on us why we had met with so little success in the morning, for it kept us both busy to keep track of the little greenish bird traveling high up among the green leaves. However, after a half hour or so she disappeared in a place where one watcher would not have been able to guess at her whereabouts, but to the other, she was easy, and two steps to one side revealed the nest. A climb of forty-five feet in a leaning basswood reached the nest, which contained one egg only, but as we were not very sanguine of finding more we took it.

We then decided to hunt together, and the difficulty was solved.

We soon located a male, singing and preening himself, and one sat down to watch while the other hunted within call. In ten or fifteen minutes he ceased preening and began to feed, and then, as before, it kept two pairs of eyes and two B. & L. Stereo glasses exceedingly busy to follow him. Presently he darted out and gave chase to another bird who proved to be his mate, and immediately we quit watching the male and followed the female. In less than five minutes she ceased feeding and flew sixty yards, straight to the nest, in full view on a bare limb of basswood fifty feet from the ground and six feet out from the trunk. This nest is supported by one small twig which passes through one corner of it; but it is for the most part saddled on the limb just as the Blue-gray Gnatcatcher's or the Ruby-throated Hummingbird's often are. It measures outside two inches high and three inches wide; inside $\frac{5}{16}$ deep by $1\frac{7}{8}$ wide. The supporting limb is one inch in diameter just below the nest, which is mainly composed of grasses and a few bark fibres, with a scanty lining of black horsehairs in the bottom and on one side, the other side being less heavily built and lacking the lining. The whole is covered with the same silvery-gray bark strips that the Redstart uses so freely, with some intermingling of cobwebs, both barkstrips and cobwebs having the appearance of being put on while wet. Incubation was half finished, and the four eggs measure, by average, .67 × .52 in., the extremes being .68 × .52 and .66 × .51. The ground color is bluish white and is very thinly covered with small spots of light brown and purplish, but around the large end is a fairly heavy circle of the same.

By this time we found the problem solved, and by hunting together we found the nest of almost every male we started to watch and of every female we saw. The next one had to be watched only a short time before his mate was found and we watched her for some time building a nest about thirty feet up in a tall, slim maple, the nest being against the trunk, and apparently semi-pensile. This was a peculiarity far from their usual method, but as we did not wish to disturb them, in the hope that we would return again, we left it. Unfortunately this hope was not realized.

We then walked along for some minutes without finding a

male in a favorable location, those we saw being in the tops of very tall elms, where it was impossible to watch them well, and where we could not have got the nest even if we found it. Strolling along, however, one of us suddenly saw a female and watched her to the nest before the other got a glimpse of her at all. This nest was in a sloping basswood, forty feet from the ground and four or five feet from the trunk, on a heavy ascending limb which measures one and three fourths inches in diameter just below the nest, which is built at the offsetting of a seven eighth inch branch, beside which are two small twigs whose leaves sheltered the nest from above. It measures $1\frac{3}{4}$ inches high on the outside and $2\frac{3}{4}$ wide; inside it is 1 inch deep by $1\frac{7}{8}$ wide. The composition of the nest is identical with the one already described, except that the lining, which was entirely black in the other, is in this one red and is made of red cowhairs, red rootlets and a very few white horsehairs. Incubation was one half completed, and the four eggs measure by average, .66 × .53 inches, the extremes being, .65 × .53 and .69 × .53. The coloring is similar to that of those already described with a few spots of darker brown in the ring. This nest contained a Cowbird's egg also, and the five eggs filled the shallow nest exceedingly full.

We soon located another male, and found his mate within ten minutes and the nest shortly after. This was in an oak, and only twenty-three feet from the ground. The nest contained four eggs of the usual ground color, many of the spots being large and of a lighter brown color. Incubation was so far advanced that it was found impossible to make good specimens of them. This ended the day, which had yielded us three sets of four, one nest with one egg, and two nests building.

At London, on June 11, the nest just commenced on June 3 was found to be covered by the female; and on June 16 it was taken. It was in a maple thirty-five feet from the ground, and six feet out on an ascending limb. Sitting at work just below the nest-limb I found the trunk of the tree, on a level with my eyes, was two inches in diameter, which gave no chance to work from above the nest. However, by the use of a long-range tree pruner, and very careful work, I managed to get the limb safely off and drew it in. The nest was situated on a horizontal branch just

after its separation from the parent limb, which was one and one fourth inches in diameter before the crotch. It is composed of grass and weed stems and a few bark strips and lacks the hair lining entirely, being sparsely lined with some small, red-brown fruit stems. On the outside there is very little of the silvery covering of the others, but a small twig, encircling the nest for half its circumference and thoroughly well bound into it, gives it a far greater air of substantiality than have the others. The leaves of this twig and its branchlets so completely hid the nest from view that there were but two points from which it could be seen at all well. It measures $1\frac{3}{4}$ inches high by $2\frac{3}{4}$ wide outside, and on the inside $\frac{7}{8}$ by $1\frac{3}{4}$ wide. It contained five eggs, one of them a Cowbird's. They appear larger than the other sets, possibly on account of their ground color being creamy white instead of bluish white; but the average measurement of .67 × .53 shows the difference to be trifling. The largest egg is .67 × .54 and the smallest .66 × .53. They are spotted more regularly than the others, over the whole surface, but yet have a well-marked ring. The spots are of a lighter brown with a sprinkling of lilac and the eggs closely resemble some sets of the Redstart, while the former sets bore a greater resemblance to the eggs of the Yellow Warbler, only that the spots are more brownish than in that species.

A feature that interested me very much was the extreme shallowness of the nests; all the other Warblers with which I am acquainted building a comparatively deep nest, and the query arises, Does the bird build a shallow nest because it places it on a substantial limb, or does it place it on a substantial limb because its nests are shallow? The attachment of the nest, also, is exceedingly frail, and I am inclined to think that few of these nests would remain in position long after the young had left. Of the eight nests found this year, two were in oaks, two in maples, and four in basswoods, showing a marked leaning toward the latter tree. The only other nest found near London was noted by Mr. Robert Elliott of Brymeston in 1899, in an elm, about fifty-five feet from the ground and ten feet out from the trunk, where such a prudent climber as I am, had no desire to take it.

NORTH AMERICAN BIRDS COLLECTED AT SANTA MARTA, COLOMBIA.

BY J. A. ALLEN.

IN A collection of about 3000 birds made for the American Museum of Natural History in the Santa Marta district of Colombia, under the direction of Mr. Herbert H. Smith, during the period from May 4, 1898, to September 7, 1899, are many species of North American migrants, quite a number of which have not been previously recorded from this portion of South America. Although a report on the collection as a whole has recently been published,[1] it may interest many readers of 'The Auk' who are not likely to see this report, to have placed before them a list of the North American species, with the dates and places of capture.

Credit should be given in this connection to Mrs. Herbert H. Smith, already so well known as an experienced ornithological collector in various parts of tropical America, for the formation of this valuable collection. The localities at which the following list of North American species was obtained are nearly all in the low coast region near the town of Santa Marta. The list embraces only North American migrants, and does not include such North American species as are also resident and breeding birds in Colombia. Those marked with an asterisk (*) were not previously recorded from the Santa Marta district of Colombia. Cienaga, where most of the shore birds were taken, is on the coast, about twenty miles south of Santa Marta. This is apparently the only point on the seashore where collecting was done, and only about a week was spent at this point. No thorough collecting for water birds on any part of this portion of the Colombian coast has thus far been done.

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[1] List of Birds collected in the District of Santa Marta, Colombia, by Mr. Herbert H. Smith. By J. A. Allen. Bull. Am. Mus. Nat. Hist., Vol. XIII, pp. 117–183. August 25, 1900. An annotated list of 388 species.

1. * **Butorides virescens.** GREEN HERON. — A single specimen was taken at Bonda, near Santa Marta, in October, 1898. There is also one record for Venezuela (Lake Valencia, Sclater and Salvin, P. Z. S. 1869, 250).

2. * **Tryngites subruficollis.** WHITE-RUMPED SANDPIPER. — Cienaga, Sept. 12 and 17, 1898. Ranges south to Paraguay.

3. * **Bartramia longicauda.** BARTRAMIAN SANDPIPER. — A single specimen was taken at Cienaga, Sept. 15, 1898. Ranges south to southern Brazil, Uruguay, and northern Argentina.

4. **Actitis macularia.** SPOTTED SANDPIPER. — Several specimens were taken at Cienaga, Sept. 13 and 14, 1898. Previously recorded from La Concepcion, March 23, 1889, by Mr. Bangs (Proc. Biol. Soc. Wash., XIII, 1899, 92). Ranges south to southern Brazil.

5. **Totanus solitarius.** SOLITARY SANDPIPER. — Three specimens were taken at Cienaga, Sept. 10–12, 1898. Previously recorded from Santa Marta (Dec. 16, 1878) by Salvin and Godman (Ibis, 1880, 178).

6. * **Totanus flavipes.** YELLOW-LEGS. — One specimen, Cienaga, Sept. 12, 1898. As is well known, this species ranges south to Patagonia.

7. * **Micropalama himantopus.** STILT SANDPIPER. — A single specimen was taken at Cienaga, Sept. 12. Has been recorded from Uruguay, Peru, and Chili.

8. * **Tringa maculata.** PECTORAL SANDPIPER. — One specimen, Cienaga, Sept. 14. Ranges south to Patagonia.

9. * **Tringa minutilla.** LEAST SANDPIPER. — A series of eight specimens was taken at Cienaga, Sept. 10–14. Apparently common. There are various records for eastern Brazil; Pernambuco appears to be its most southern record.

10. * **Ereunetes pusillus.** SEMIPALMATED SANDPIPER. — Two specimens were taken at Cienaga, Sept. 12.

11. **Buteo latissimus.** BROAD-WINGED HAWK. — This is apparently an abundant winter resident in this region. The dates for the seven specimens collected are Bonda, from Nov. 13, 1898, to March 26, 1899, and Valparaiso (alt. 5000 ft.), March 21. Salvin and Godman (Ibis, 1880, 177) and Bangs (Proc. Biol. Soc. Wash., XII, 1898, 132) have, respectively, recorded it from Minca (Jan. 17 and 22), and Santa Marta (winter).

12. * **Coccyzus americanus.** YELLOW-BILLED CUCKOO. — Nine specimens were collected at Bonda, Oct. 27 to Nov. 21, 1898. Ranges south to southern Brazil and northern Argentina.

13. **Tyrannus tyrannus.** KINGBIRD. — Not represented in the Smith Collection, but recorded from Santa Marta (April 4) by Salvin and Godman (Ibis, 1880, 125). Has also been recorded from as far south as the Upper Amazon and Bolivia.

14. **Myiarchus crinitus.** CRESTED FLYCATCHER. — Five specimens were taken at Bonda, at various dates from Nov. 22 to Feb. 27. Previously recorded from Santa Marta, by Bangs (*l. c.*, XII, 137). This is nearly the southern limit of its known range, a single specimen having

been recorded from Bucaramanga, Colombia, about 400 miles south of Santa Marta, by Count von Berlepsch (J. f. O., 1884, 303).

15. **Nuttallornis borealis.** OLIVE-SIDED FLYCATCHER. — A single specimen was taken at San Lorenzo (alt. 7500 ft.), May 13, 1899. Previously recorded from Minca (March 13) by Salvin and Godman (Ibis, 1880, 125), and from La Concepcion (March 8) by Bangs (*l. c.*, XIII, 98). It has not been recorded from south of Bogota, Colombia.

16. **Contopus virens.** WOOD PEWEE. — A specimen was taken at Valparaiso, April 19, and another at Cacagualito, May 10 — a very late record for so far south. It was previously recorded from Santa Marta — a single specimen, April 5 — by Godman and Salvin (Ibis, 1880, 125). Bogota, Colombia, seems to form its present known southern limit.

17. **Empidonax virescens.** GREEN-CRESTED FLYCATCHER. — The four specimens taken were obtained at Bonda, Nov. 16, Onaca, Dec. 28 and Jan. 21, and Valparaiso, March 21. There is a previous winter record for the species for Santa Marta (Bangs, *l. c.*, XII, 137), these forming its only Colombian records. It has, however, been recorded from western Ecuador.

18. **Icterus galbula.** BALTIMORE ORIOLE. — Although this species is not represented in the Smith Collection, it has been twice recorded from the Santa Marta district — from Minca, Feb. 12, 1879, by Salvin and Godman (Ibis, 1880, 123), and from Santa Marta (winter) by Bangs (*l. c.*, XII, 139). These are the most southern records for the species.

19. * **Dolichonyx oryzivorus.** BOBOLINK. — A specimen was taken at Cienaga, Sept. 12, and another at Bonda, Oct. 12 — the only Colombian records, although it has a wide winter distribution in South America, extending to Bolivia and the southern border of Brazil.

20. **Spiza americana.** DICKCISSEL. — Four specimens were taken at Bonda, Jan. 4 and 5, and Mar. 21. It is also recorded by Bangs (*l. c.*, XII, 140) from Santa Marta. It has been also reported from other parts of Colombia, and from Venezuela and Guiana.

21 **Zamelodia ludoviciana.** ROSE-BREASTED GROSBEAK. — This species was taken at Masinga Veija, Nov. 23, and at Valparaiso, March 29. Previously recorded from Minca (Jan. 29) by Salvin and Godman (Ibis, 1880, 122), and by Bangs (*l. c.*, XII, 140) from Santa Marta. It has a wide winter range in northern South America, specimens having been recorded from western Colombia and central Ecuador.

22. **Piranga rubra.** SUMMER TANAGER. — Apparently a common winter visitant, the Smith Collection containing thirty-three specimens, taken mostly at Bonda, and at various dates from Nov. 8 to March 17. It has been previously reported from the region by Salvin and Godman (Ibis, 1879, 200, and 1880, 121) and Bangs (*l. c.*, XII, 141). Some of the males taken in November were in the fully adult red plumage; others taken in December and January were moulting into the red dress, while a number of young males taken in these months showed no trace of moulting. The known winter range of the species extends to Peru and Bolivia.

23. **Vireo flavifrons.** YELLOW-THROATED VIREO. A single specimen was taken at Onaca, Dec. 28. A single specimen has also been recorded from Minca (Feb. 13), by Salvin and Godman (Ibis, 1880, 118). This species appears to rarely pass south of the West Indies and Central America.

24. **Vireo olivaceus.** RED-EYED VIREO. — This is an apparently rare visitor to northern South America. It is not contained in the Smith Collection, but has been recorded from Santa Marta, April 3, by Salvin and Godman (Ibis, 1880, 118). It has also been recorded from southern Brazil (Allen, Bull. Am. Mus. Nat. Hist., III, 346), and from Bucaramanga by Count von Berlepsch (J. f. O., 1884, 285).

25. **Setophaga ruticilla.** REDSTART. — This abundant winter visitor to the northern border of South America is represented by a series of fourteen specimens, taken at Bonda from Sept. 2 to Jan. 10, and at Valparaiso from March 11 to 30.

26. **Geothlypis philadelphia.** MOURNING WARBLER. — Mr. Bangs records (*l. c.*, XIII, 105) a series of ten specimens of this species from Chirua and La Concepcion, taken Feb. 12 to March 25.

27. ***Geothlypis agilis.** CONNECTICUT WARBLER. — A single specimen was taken at Bonda, Oct. 22. This, so far as I am aware, is the second winter record for this species, Count von Berlepsch (J. f. O., 1889, 90) having recorded a single specimen from Tonantins, Brazil, on the middle Amazon, taken April 9, 1884.

28. **Geothlypis formosa.** KENTUCKY WARBLER. — Five specimens were taken at Bonda, Oct. 7 to Nov. 24, and Mr. Bangs (*l. c.*, XII, 144) has recorded a single specimen from Santa Marta. These appear to be the first records for the species south of Cuba and Central America.

29. **Seiurus noveboracensis.** WATER-THRUSH. — This species was taken at Bonda at various dates from Sept. 8 to Nov. 5, and at Cienaga, Sept. 14. It has been previously recorded from this district by Salvin and Godman (Ibis, 1880, 117), and by Bangs (*l. c.*, XIII, 105), the dates being Feb. 7 and March 17. Mr. Bangs has also recorded (*l. c.*) a single specimen he refers to *Seiurus noveboracensis notabilis*, taken at Chirua, Feb. 7.

30. **Seiurus motacilla.** LOUISIANA WATER-THRUSH. A single specimen was taken at Bonda, Nov. 8, and Mr. Bangs has recorded (*l. c.*, XII, 143) another example from Santa Marta. These are the first records for the species known to me from northern South America.

31. **Dendroica æstiva.** YELLOW WARBLER. — An abundant winter resident. It was collected at Bonda as early as August 27, and at later dates at the same place till Jan. 31. There are various previous records for Colombia and Ecuador.

32. ***Dendroica striata.** BLACK-POLL WARBLER. — A series of thirty-one specimens was taken at Bonda, all collected Oct. 7 to Nov. 22, indicating its great abundance during that particular period. There are previous records for Bogota and various other localities in northern South America.

33. ***Dendroica castanea.** BAY-BREASTED WARBLER. — A single young male was taken at Bonda, Oct. 27. It had been previously taken at a few other points in central and western Colombia.

34. ***Dendroica cærulescens.** BLACK-THROATED BLUE WARBLER. — An adult male was taken at Las Nubes, Dec. 16 — apparently the first South American record for the species.

35. ***Dendroica blackburniæ.** BLACKBURNIAN WARBLER. — Six specimens were collected at Las Nubes and Valparaiso, Dec. 10–13, and March 24–29. The species is a rather common winter migrant to northern South America (south to central Peru), though not previously recorded from the Santa Marta region.

36. **Helminthophila peregrina.** TENNESSEE WARBLER. — The dates for the eleven specimens of this species extend from Nov. 3 to April 4. It is a well known winter migrant to northern South America — Venezuela, Colombia, and Ecuador.

37. **Helminthophila chrysoptera.** GOLDEN-WINGED WARBLER. — This species was taken at Bonda, Sept. 6 and Oct. 3, and at Las Nubes, Dec. 7. Recorded from Minca, Feb. 8, by Salvin and Godman (Ibis, 1880, 117), and from Pueblo Viejo, March 20, by Bangs (*l. c.*, 1898, 160).

38. **Helminthophila pinus.** BLUE-WINGED WARBLER. — Mr. Bangs reports (*l. c.*, XIII, 105) the capture of a single specimen at Chirua, March 21 — the first Colombian, and apparently the first South American, record for the species.

39. **Protonotaria citrea.** PROTHONOTARY WARBLER. — A series of thirty-seven specimens, all from Bonda, and collected Oct. 8 to Jan. 30, indicates that this is a locally abundant winter visitor. Mr. Bangs (*l. c.*, XII, 143) has recorded it from Santa Marta, and there are previous records for other parts of Colombia and Venezuela.

40. **Mniotilta varia.** BLACK AND WHITE WARBLER. — Taken at Bonda as early as August 21, and at Onaca as late as Jan. 4. Salvin and Godman record (Ibis, 1880, 117) it as taken at Minca Jan. 14 and 17. It is a well known migrant to Colombia and Venezuela.

41. ***Hylocichla fuscescens.** WILSON'S THRUSH. — Three specimens were taken at Bonda, Oct. 5, 7, and 13. Its winter range is well known to extend to southern Brazil.

42. **Hylocichla ustulata swainsoni.** OLIVE-BACKED THRUSH. — Taken at Bonda Nov. 5 and in January. Previously recorded for this region by Salvin and Godman (Ibis, 1880, 115) and by Bangs (*l. c.*, XIII, 107), a single specimen from Chirua Feb. 16. It has also been collected at Bucaramanga, and at several points in Ecuador, and in central Peru.

43. **Hylocichla aliciæ.** GRAY-CHEEKED THRUSH. — This species is represented by a series of sixteen specimens, collected at Bonda, Onaca, Las Nubes, and Valparaiso, from Oct. 7 to April 7, showing it to be a common winter visitor, arriving early and departing late. Mr. Bangs has also recorded (*l. c.*, XII, 144) it from Santa Marta. It has also been taken at Bucaramanga and Bogota, and in Ecuador and eastern Peru.

THE MOULT OF THE NORTH AMERICAN SHORE BIRDS (LIMICOLÆ).

BY DR. JONATHAN DWIGHT, JR.

THE Limicolæ of North America constitute a large group of closely related species which also greatly resemble each other in their successive plumages and moults. Probably the best known of them are the Sandpipers, Yellow-legs, Curlews, Plovers, and others included under the popular name of 'Bay-snipe' which frequent our seashores, although the Woodcock and the Snipe may be more familiar acquaintances to the average sportsman. They are all birds of strong flight, and the bulk of them, breeding in Arctic regions, push southward in flocks in the autumn and again northward in the spring. In their migration many of them cross the equator in both hemispheres, some even reaching Patagonia and South Africa. As a result of this long line of migration, in some species, thousands of miles in length, they appear to tarry but for a brief period on the journey, so that in most cases we know little of their plumages other than their migration dress, and still less of the moults by which changes are effected. In fact, so little has been known that belief in extensive color changes in old feathers, especially in cosmopolitan species, has prevailed, although such belief now proves to be groundless because contrary to facts which, it may be said, are none too well known. The reasons are not far to seek. There is a great scarcity in collections of birds which show actual moult, and there is an even greater scarcity of adults in winter plumage, so it has escaped notice that young birds and old, after a certain period in the fall, are practically indistinguishable, and, what is more, males and females assume an almost identical plumage. This sometimes renders difficult an explanation of the midwinter moult which takes place, apparently in all species. It is undoubtedly complete, to the flight-feathers and tails in most young birds, and apparently is confined to the body-feathers in adults, although it is possible that some species undergo a complete moult in adults as well as young.

Such evidence as I have been able to gather is derived from specimens in my own collection where age and sex have been determined by dissection, and from large series of skins in the American Museum of Natural History and the U. S. National Museum, which have been kindly placed at my disposal by the respective curators, Dr. J. A. Allen and Prof. Robert Ridgway. Of a few species I have examined birds taken almost every month in the year, but every attempt to link together the successive plumages is much like trying to read a book from which stray pages have been torn. However, I find that what is true of Passerine birds and of the Grouse is equally true of the Shore Birds, viz., that *Every species has a definite sequence of plumages and of moults, the plumages being modified by wear and changed by moult.*

This principle of sequence of plumages, which I have explained at length in previous papers, is illustrated by a scheme of plumages and moults which was originally laid out for Passerine species (Annals N. Y. Acad. Sci., XIII, 1900, p. 104) but it is equally applicable to the Shore Birds. It shows the plumages in their natural sequence followed by the moults that occur, unless suppressed, as they are in some species, and it is as follows:

1. Natal Down.	1. Postnatal Moult.
2. Juvenal Plumage.	2. Postjuvenal Moult.
3. First Winter Plumage.	3. First Prenuptial Moult.
4. First Nuptial Plumage.	4. First Postnuptial Moult.
5. Second (or Adult) Winter Plumage.	5. Second (or Adult) Prenuptial Moult.
6. Second (or Adult) Nuptial Plumage, etc.	6. Second (or Adult) Postnuptial Moult, etc.

Later plumages would be 'winter' and 'nuptial,' followed by 'prenuptial' and 'postnuptial' moults. This scheme furnishes definite terms which are almost indispensable for a proper explanation of the plumage changes which regularly occur as birds pass from immature to adult dress and from summer to winter plumages.

In many species of the Shore Birds, plumage differences between young and old are lost at an early period. All adults at the postnuptial moult assume a plumage that in one class of

birds is often indistinguishable from the juvenal, in another indistinguishable from the first winter dress, the difference being in the young birds. The first class of young birds retains the juvenal plumage, modified only by wear, until a mid-winter or spring moult takes place, the second assumes a distinct first winter plumage by an early postjuvenal moult, which involves only the body feathers, the tertiaries and a few of the lesser wing-coverts. As both classes of young birds and the adults of all species undergo a prenuptial moult by which the nuptial or breeding dress is assumed, it seems desirable to speak of a prenuptial moult (rather than of a delayed postjuvenal) in birds of the first class. The facts are not altered, but we must say, for convenience, that in this class the postjuvenal moult is omitted or suppressed and the first winter plumage is simply the juvenal modified by wear.

The following are some of the species belonging to the first class, viz., American Woodcock (*Philohela minor*), Wilson's Snipe (*Gallinago delicata*), Pectoral Sandpiper (*Tringa maculata*), Solitary Sandpiper (*Totanus solitarius*), Spotted Sandpiper (*Actitis macularia*), Long-billed Curlew (*Numenius longirostris*), Killdeer (*Ægialitis vocifera*), Semipalmated Plover (*Ægialitis semipalmata*), and Turnstone (*Arenaria interpres*).

The second class includes, among others, the following, viz., Red Phalarope (*Crymophilus fulicarius*), Northern Phalarope (*Phalaropus lobatus*), Wilson's Phalarope (*Phalaropus tricolor*), American Avocet (*Recurvirostra americana*), Dowitcher (*Macrorhamphus griseus*), Long-billed Dowitcher (*Macrorhamphus scolopaceus*), Stilt Sandpiper (*Micropalama himantopus*), Knot (*Tringa canutus*), White-rumped Sandpiper (*Tringa fuscicollis*), Least Sandpiper (*Tringa minutilla*), Semipalmated Sandpiper (*Ereunetes pusillus*), Dunlin (*Tringa alpina*), Red-backed Sandpiper (*Tringa alpina pacifica*), Greater Yellow-legs (*Totanus melanoleucus*), Yellow-legs (*Totanus flavipes*), Willet (*Symphemia semipalmata*), Bartramian Sandpiper (*Bartramia longicauda*), Buff-breasted Sandpiper (*Tringytes subruficollis*), Sanderling (*Calidris arenaria*), Black-bellied Plover (*Charadrius squatarola*), and American Golden Plover (*Charadrius dominicus*).

It is evident that the feathers of the juvenal plumage must be

fully developed before the southward migration is attempted; but the occurrence of many specimens of many species far from their breeding grounds shows the serviceable nature of these feathers, which are only slightly less resistant to wear than those of adults. Here are two birds of the first class which illustrate the far southern range in juvenal dress, viz., *Tringa maculata*, Am. Mus. Nat. Hist., No. 30861, October, Brazil, and *Actitis macularia*, Am. Mus. No. 71427, September 14 Colombia; and there is a goodly number of other specimens and other species too numerous to specify from localities this side of the equator.

Birds of the second class also press far south in many cases before the postjuvenal moult sets in, as proved by a number of species, among them the following, viz., *Macrorhamphus griseus*, Am. Mus. No. 50148, July 5, Florida; *Tringa canutus*, Am. Mus. No. 26968, August 8, England; *Tringa fuscicollis*, Am. Mus. No. 34858, October 21, Brazil; *Totanus melanoleucus*, Am. Mus. No. 30859, October, Brazil; *Charadrius dominicus*, Am. Mus. No. 30856, August, Bolivia, and No. 58677, November 14, Brazil; *Charadrius squatarola*, Am. Mus. No. 61634, October 25, France and *Calidris arenaria*, Am. Mus. No. 30860, August, Bolivia, these specimens showing only the beginning of the postjuvenal moult. Usually, however, young birds of these and other species gradually assume new feathers of the winter dress as they travel towards their winter quarters. It is hardly necessary to specify them by number, for they are to be found in every collection. Some species are earlier than others, and there is considerable individual variation, but the first winter plumage is generally assumed during August and September, so that October or, at most, November specimens have completed the moult, which apparently never includes the flight-feathers nor the tail.

Adults, easily recognizable in the early autumn, at least until the postnuptial moult is completed, by the worn and scalloped-out feathers of the nuptial dress, probably leave their breeding grounds before beginning to moult and gradually assume their winter dress as they loiter here and there on their southward journey. They move southward much earlier than is generally supposed, and probably make long flights without stopping. I have examined specimens of various species taken in Cuba, Texas,

California, Mexico, and even Peru and Bolivia, which are in full worn nuptial plumage. Among others that have acquired much of the adult winter plumage may be mentioned the following, viz., *Tringa canutus* (U. S. Nat. Mus. No. 78419, ♀, September 1, Florida), retaining only four old primaries; *Actitis macularia* (U. S. Nat. Mus. No. 134832, August 28, San Clemente Island, California), with only four old primaries left; *Calidris arenaria* (U. S. Nat. Mus. No. 128793, October 8, Aldabra Island, Indian Ocean) with three old primaries, and No. 151633, July 17, Venezuela, with three old primaries; *Totanus melanoleucus* (Amer. Mus. Nat. Hist. No. 51240, ♀, July 29), Arizona, with six old primaries; *Macrorhamphus scolopaceus* (Am. Mus. Nat. Hist. No. 50585, ♂, July 5, Florida) with four old primaries; *Arenaria interpres* (G. B. Sennett, No. 5159, ♂ [=♀], July 1, Texas), the distal or first primary still a pin point, the second just out of its follicle, the remainder full grown, while the third primary of each wing and the proximal secondaries are still pulpy.

The beginning of this postnuptial moult, as well as of the postjuvenal, is shown by birds in almost every collection, the first feathers appearing on the humeral tracts, near their middle, and later, on the back and at either side of the breast. These feathers are fairly large, but come from very small follicles, so that the sheaths do not persist long and are often lost in the process of skinning, as I have learned by experience. The body feathers seem to come in less rapidly and more irregularly than with Passerine species, so that it is extremely easy to overlook their moult in studying dried skins. The renewal of the body feathers seems generally to be in advance of the remiges at the postnuptial moult, and to follow them at the first prenuptial. The tenth or proximal primary of each wing falls first, followed quite leisurely by the more distal, moult beginning among the secondaries with the distal member when only three or four old primaries are left. The inner secondaries, better known as tertiaries, precede the proximal primaries. The greater coverts, and a band of the lesser coverts near the anterior edge of the wing, also precede them. The rectrices are not renewed as a rule before nearly all of the primaries have been replaced. The last feathers to be renewed are those of the chin, sides of head and mid-abdomen. A few

winter specimens with the outer primaries much more worn than the inner seem to point to the checking of moult in some cases and this failure to moult at the proper time is much more common in body feathers.

Few birds taken on the North Atlantic coast show moult of the remiges in progress, but many species in collections, those in my own collection represented by specimens studied while fresh, show renewal of the body feathers by the postnuptial moult which, as proved by southern specimens, is usually completed in August or September. The adults of species with a postjuvenal moult begin moulting earlier than young birds, a fact which may account in part for the migration of males earlier than the females and young, just as in Passerine species. My experience for years has been that the birds seen in July and early August are largely adults, and intelligent gunners everywhere tell the same story. Later than October it is not easy to distinguish old from young unless the latter retain here and there distinctive feathers of the juvenal plumage, or the former retain a few feathers of the nuptial dress. A few tell-tale feathers remaining until a later period of moult are invaluable in fixing age, for plumage differences between young and old in winter are slight and inconstant as a rule, although more marked in some species than in others.

The amount of wear shown by the plumage varies with the individual, and black feathers outwear those of any other color. The primaries and secondaries show so little wear that even the microscope will not demonstrate how much newer one feather is than another without other evidence, but the finding of growing feathers often confirms the testimony of worn plumage, and it is upon the testimony of such 'blood-feathers,' as they have felicitously been called, that all my conclusions are based.

There is abundant evidence that adults and young both undergo a prenuptial moult which certainly involves the body plumage of both; in young birds of many species the moult is complete, except perhaps in the case of some females; in adults it does not seem to include the remiges nor the rectrices.

Comparatively few specimens show winter moult of the remiges, but among them may be mentioned the following, viz., *Crymophilus fulicarius* (U. S. Nat. Mus. No. 86423, February 21, Lower

California), with the three proximal primaries growing, and no new body feathers as yet; *Tringa fuscicollis* (U. S. Nat. Mus. No. 116227, ♀, January 16, Gregory Bay, Patagonia) the primaries new except the first, the middle pair of rectrices new, but no new body feathers; *Actitis macularia* (U. S. Nat. Mus. No. 169037, ♀, February 9, Culebra Id., W. I.), retaining one old primary, the old tail and old body plumage; *Charadrius squatarola* (Amer. Mus. Nat. Hist. No. 39072, ♀, February 27, Florida), with two old primaries remaining, together with old tail and body plumage; and other specimens, with incomplete data, which confirm the evidence of those cited. It is possible, although not probable, that some of these are adults, but the plumage seems to indicate young birds, and the rarity of adults at any season is an argument against their being adults. At all events, a moult begins in January or February, and there are many specimens of many species which show growth of new body feathers later in the winter. April specimens are often in the midst of moult or at the end of it, some of them with fresh remiges and rectrices, and others with them evidently much worn. My impression is that the more worn birds are adults, the fresher ones young birds which complete their moult earlier. The probability also is that species with a postjuvenal moult are later in consummating the prenuptial, but the material available does not furnish conclusive evidence upon these points. The numerous specimens in worn winter plumage showing no evidence of moult during February need not be cited. As adult females are indistinguishable from young males at this season, and adult males are not conspicuously different, the difficulty of drawing conclusions from them, even after the beginning of the prenuptial moult, becomes apparent.

In addition to the young birds just cited there are some others which illustrate the onset of this moult presumably in adults, viz., *Tringa alpina pacifica* (U. S. Nat. Mus. No. 102142, ♂, March 29, Japan), with worn wings and tail, but new 'blood-feathers' scattered on the body; another (No. 154206, May 10, California) still showing new feathers in the new plumage; *Calidris arenaria* (Amer. Mus. Nat. Hist. No. 45580, ♂, April 13, California), with new 'blood-feathers' on the body at various points; another (No. 60007, ♀, April 30, Florida) more advanced,

the wings and new tail indicating probably a young bird; *Macrorhamphus scolopaceus* (Amer. Mus. Nat. Hist. Nos. 49438, ♀, and 49439, ♂, March 10, California), with new body feathers just appearing; *Tringa minutilla* (Amer. Mus. Nat. Hist. No. 59511, ♀, April 22, Trinidad, W. I.), still chiefly in winter dress; and *Ægialitis semipalmata* (Am. Mus. Nat. Hist. No. 29850, ♂, April 14, South Carolina), with a few new feathers. These are only a small part of the specimens that might be cited in proof of the occurrence of a prenuptial moult in both young and old, and further evidence may be found in May specimens which are in fresh new plumage except for such feathers as fail to moult. A smaller number of these are to be found on birds that appear to be adults, a greater number on young ones, and females regularly renew fewer feathers than males of like age.

In the foregoing pages, I have outlined the facts, as we find them, concerning the moulting of the Shore Birds, but in order to emphasize and bring them out still more clearly, I purpose taking up a few familiar species and tracing their moults and plumages in natural sequence.

SPOTTED SANDPIPER (*Actitis macularia*).

1. *Natal Down.* This is well developed before the bird leaves the egg, forming a dense, continuous clothing. Above, the filaments or neossoptiles are partly banded with black and pale brown, producing a mottled olive-gray appearance, and partly black, producing the median stripe from the bill to the tail. Below, they are white, those of the sides of the head buff-tinged except a black loral and postocular streak. The anterior border and extremity of the wing and the orbital ring are white.

Many specimens from different localities illustrate this stage. Two in my own collection (J. Dwight Jr., No. 1221, June 21, New York; and No. 3612, July 6, Prince Edward Island, Canada) are typical examples.

2. *Juvenal Plumage* acquired by a complete postnatal moult, the down filaments being really a continuation of the apical barbs of the succeeding feathers, in most cases, but not found at the

apices of the remiges. This stage is characterized by the olive-green upper surface, the feathers of the back especially being edged with buff and having a subterminal bar of dull black, those of the wing-coverts with a second indistinct bar. Below, pure white prevails, with gray on the sides of the throat.

The growth of this plumage may be traced during July and early August, males and females being indistinguishable. One of my birds (J. D. Jr., No. 4123, July 7, Quebec) shows remiges about two thirds grown, the rectrices about one third and with the down still attached, which also adheres to new feathers of the crown, back, and sides of breast; on the forehead, sides of head, the nape, throat and mid-abdomen the down has not yet been displaced. Another (J. D. Jr., No. 6437, August 5, Nova Scotia) with grown but pulpy outer primaries, is so advanced that down only remains on the chin, the bird being fully feathered. Another (J. D. Jr., No. 6812, July 15, New York) is still more advanced, with few traces of immaturity.

As adults at their postnuptial moult assume a dress scarcely distinguishable from this, I can only point out some differences that unfortunately do not hold in all cases, especially in females. Young birds are practically without dusky shaft-lines on the feathers of the throat, the barring of the back and wing-coverts is duller, the tertiaries lack the dusky blotches of the adult and the outer pairs of rectrices are less distinctly white and blotched more irregularly with duller black.

In both young and adults, wear soon begins to change the appearance of this dress, which is usually called the autumnal plumage. Not only do the buff edgings fade, but the feather tips break away until even the subterminal barring is lost, except on the wing-coverts where the second bar is retained late into the winter. August specimens, from the Atlantic coast as well as from Arizona, show gradual loss of the edgings. Two specimens in my collection (J. D. Jr., No. 6814, September 5, New York and No. 6695, September 1, Quebec) still retain most of the buff edgings, although much faded, while two others (J. D. Jr., No. 386, August 26, Connecticut, and No. 6816, September 18, New York) have almost completely lost even the dusky bars. The southern range while in this plumage is shown by a somewhat

worn specimen from South America (Am. Mus. Nat. Hist. No. 71427 September 14 Colombia).

3. *First Winter Plumage* acquired apparently wholly by wear, by which the upper parts become uniformly olive green *without edgings* except a few dusky bars on the wing-coverts. It is convenient to call this stage the winter dress, and to consider the postjuvenal moult as suppressed in this species. There are many Passerine birds in which the nuptial or breeding plumage is simply the autumnal dress modified by wear, and if we are justified in calling a worn autumnal or winter plumage, the breeding dress of these birds, so we are justified in calling a worn juvenal plumage, the first winter plumage. Whatever we choose to name it, it is worn at least until the beginning of January, as proved by numerous October, November and December specimens, of which, among many with incomplete data, I may cite the following as apparently young birds: Amer. Mus. Nat. Hist. No. 51294, ♂, December 8, Arizona; U. S. Nat. Mus. No. 86420, ♀, January 6, Lower California; U. S. Nat. Mus. No. 120277, ♀, January 3, Honduras.

4. *First Nuptial Plumage* acquired by a prenuptial moult probably complete, as indicated by a number of specimens, some unfortunately without dates. While it is possible that some of these birds which show actual feather growth, especially of the remiges, are adults, it is not at all probable, judging by their plumage and by the usual scarcity of adults at any season. The following serve to prove the occurrence of a complete moult, viz., U. S. Nat. Mus. No. 169037, ♀, February 9, Culebra Island, has renewed the primaries, except the worn distal one, the rectrices and body plumage being mostly old and worn; U. S. Nat. Mus. No. 74051, ♂, February, St. Vincent Island, West Indies, retains two old distal primaries, tail and body plumage; U. S. Nat. Mus. No. 81016, ♂, [no date], St. Thomas Island, W. I., has the remiges and part of the rectrices still in their sheaths, and new nuptial feathers among those of the worn body plumage; and U. S. Nat. Mus. No. 80973, ♂, [no date] St. Eustatius Island, W. I., retains still four old primaries, but new body feathers are growing at several points.

Specimens in abundance from Florida and Arizona, taken in

April, are in fresh new plumage, indicative of recent moult, and some of them occasionally show 'blood-feathers.' One (Am. Mus. Nat. Hist. No. 34844, April 1, Brazil), with fresh remiges and rectrices and a sprinkling of half-grown body feathers, indicates the practical completion of the prenuptial moult before winter quarters have been abandoned.

In this, the breeding plumage, males and females are usually to be distinguished, males being more extensively spotted on the white lower parts. The spots are subterminal, so that wear first removes the white tips, and later on much of the black which, late in the summer, assisted by fading, may nearly disappear from the throats, in some cases, as well shown by one of my birds (J. D. Jr., No. 3938, ♂, August 19, Quebec). The barring of the back in the nuptial dress is so heavy on each feather and so far removed from its apex, that it is only lost in excessively worn specimens, as shown by another of my birds (J. D. Jr., No. 4171, ♂, July 29, Quebec).

5. *Second or Adult Winter Plumage* acquired by a complete postnuptial moult accomplished in August or September.

Adults, as birds may now be called, either move south in the autumn before moulting or possibly take such good care of themselves while moulting that few find their way into collections. Some reach Cuba (U. S. Nat. Mus. No. 23601, September 3) and Mexico (U. S. Nat. Mus. No. 57709, August 14) without moult, while others, taken far from their breeding grounds, show the postnuptial moult in progress, viz., U. S. Nat. Mus. No. 134832, August 28, San Clemente Island, California, still retains four old primaries and all of the tail except the middle pair of rectrices which are sprouting; Amer. Mus. Nat. Hist. No. 30863, August, Bolivia, which has five old primaries, the rest being new as well as the rectrices (except the outer pair) and the greater coverts; and two birds No. 71426, September 13, and No. 71428, September 14, Colombia, showing extensive moult of the body plumage.

The plumage acquired resembles closely the juvenal, under which the slight average differences have been noted, and wear soon fades and removes the buff edgings as in the young bird.

6. *Second or Adult Nuptial Plumage* acquired by a prenuptial moult which undoubtedly includes the body-feathers, tertiaries,

and a few of the lesser coverts, but apparently not the remiges nor the rectrices. I have already discussed the evidence which proves a moult in adults as well as young birds, the late winter specimens with worn wings and tails indicating either adults or possibly young females. One specimen may be cited in full winter dress at a late date (U. S. Nat. Mus. No. 133016, March 19, [Arizona ?]).

The following species has a distinct postjuvenal moult.

SANDERLING (*Calidris arenaria*).

1. *Natal Down.* Not seen by me.

2. *Juvenal Plumage* acquired by a complete postnatal moult. This plumage is much washed with buff, the edgings of many of the feathers distinctly buff, including those of the sides of the breast, the tint fading quite rapidly. A bird (Am. Mus. Nat. Hist. No. 60751, ♀, August 20, Labrador) of fresh plumage illustrates this stage.

3. *First Winter Plumage* acquired by a partial moult which includes the body plumage, tertiaries, and wing-coverts but not the remiges nor rectrices. A wholly gray plumage, white below, is assumed and, save for left-over tell-tale feathers, especially tertiaries, young birds become practically indistinguishable from adults that have completed their postnuptial moult, although the feathers of young birds are paler centrally and therefore with less obvious shaft-streaks. September and October specimens in every collection show the gradual growth of the gray body feathers and one from Bolivia (Amer. Mus. Nat. Hist. No. 30860, August) shows that this far southern locality may be reached before the moult is far advanced. Another specimen (U. S. Nat. Mus. No. 161921, October 1, Virginia) is largely in first winter dress; also one (G. B. Sennett, No. 404, ♂, November 1, Pennsylvania) and one (Am. Mus. Nat. Hist. No. 64551, ♀, November 9, Lower California), possibly an adult, is wholly gray. Among winter specimens of young birds, determined by retained juvenal feathers, especially dusky-tipped tertiaries, the buff edgings of which fade to white, are the following, viz.; U. S. Nat. Mus. No. 163525, January 9, California; No. 102063, Jan-

uary, Heligoland Id., and Amer. Mus. Nat. Hist. No. 64542, ♂, January, Heligoland Id. Several much worn February birds that may be either young birds or adults are still in full winter dress.

4. *First Nuptial Plumage* acquired by a prenuptial moult that appears to be complete, although possibly not in females. The reddish dusky barred feathers of the throat are assumed with the black, gray or rusty edged feathers of the back, young and old being practically indistinguishable although adults are richer in color and there are fewer winter feathers left behind when the moult is completed. Several specimens illustrate different stages, viz.: Am. Mus. Nat. Hist. No. 49827, ♂, April 19, Florida; No. 45485, ♀, April 13, California; No. 60007, ♀, April 30, Florida, all showing 'blood-feathers' of the body plumage and of the rectrices to a greater or less degree.

5. *Second or Adult Winter Plumage* acquired by a complete postnuptial moult in July, August, September and October. Many August and September specimens show new gray winter feathers creeping in on the back while new white ones below gradually efface the reddish colors. As early as July 7 one specimen (U. S. Nat. Mus. No. 151633, Venezuela) is largely in winter dress, retaining only three old primaries, while another (U. S. Nat. Mus. No. 102064, ♂, October 31, Peru) still retains five old primaries. Two birds (U. S. Nat. Mus. Nos. 128793 and 128795, October 8, Aldabra Id., Indian Ocean) are in the midst of moult, retaining three distal primaries, the others, with most of the body plumage and the inner pairs of rectrices being new. The full winter dress, which differs very little from that of young birds, is shown by various specimens; U. S. Nat. Mus. No. 128796, November 10, Aldabra Id., Indian Ocean; G. B. Sennett, No. 3938, January, Texas; Amer. Mus. Nat. Hist. No. 39075, February 23, Florida (possibly a young bird).

6. *Second or Adult Nuptial Plumage* acquired by a prenuptial moult that involves the body plumage and part of the wing-coverts but apparently not the remiges nor rectrices. An undoubted adult (Amer. Mus. Nat. Hist. No. 45580, ♂, April 13, California) is instructive, retaining a few feathers of the previous nuptial dress, much worn, part of the winter dress less worn, and with new body feathers growing at many points. A similar spec-

imen (G. B. Sennett, No. 3685, ♀, March 28, Texas) may also be cited. The full plumage may not be acquired until early in May.

Another species that has the same sequence of moults and plumages as the Sanderling, is the Dunlin which may well be considered along with its North American representative.

DUNLIN *(Tringa alpina).*

RED-BACKED SANDPIPER *(Tringa alpina pacifica).*

1. *Natal Down.* The chick above has rusty and golden brown and black mottling, with small white dots. The mixed colors are due to banded down filaments or neossoptiles and the spotting to subterminal white areas. Below, including cheeks and forehead, the neossoptiles are buffy white, a dusky loral and postocular streak and a fainter malar one.

2. *Juvenal Plumage* acquired by a complete postnatal moult. It is not generally known that birds in this plumage are quite heavily spotted below with black, the back with reddish and buff edgings, and a buff wash on the throat, so that they much resemble adults in breeding dress. I have examined several July and August birds from Alaska, a perfectly typical one, still retaining a little down on the head and neck being (U. S. Nat. Mus. No. 88881, August 3, Pt. Barrow, Alaska).

3. *First Winter Plumage* acquired by a partial postjuvenal moult involving the body plumage, sometimes all, and sometimes part of the tertiaries, a few of the wing-coverts but neither the remiges nor rectrices. The gray plumage, white below, is assumed, scarcely distinguishable from adults in winter dress, but the central part of the dorsal feathers is usually paler than in adults, likewise the gray shaft-streaks of the throat and sides. Left-over juvenal feathers are often found, and the black-spotted ones of the lower parts become faded and worn and may easily be mistaken for those of the adult. This plumage is fully assumed by October, as shown by many specimens from many localities, numerous November and December birds showing little evidence of further moult, viz.: Am. Mus. Nat. Hist. No. 69813, ♂, October 16, New

York; No. 64972, ♀, October 19, New York; No. 47255, ♂, November 11, Washington; No. 26963, ♂, November 25, France; No. 45544, November, Texas; No. 64535, December 20, Denmark; and J. Dwight Jr. Nos. 674, ♀, 675, ♂, and 676 ♀, November 24, Delaware.

Mid-winter specimens are few and show no signs of the prenuptial moult, which evidently takes place later. The juvenal tertiaries, when retained, lose their buffy edgings and dusky tips by wear and so this distinguishing character between young and old is often obliterated. One specimen (J. Dwight Jr. No. 4897, January, California) is certainly a young bird.

4. *First Nuptial Plumage* acquired by a prenuptial moult that is apparently complete. March and April specimens regularly show growth of the new body plumage; but it is not easy to distinguish adults from young, even in winter plumage, and they become indistinguishable at the first prenuptial moult. The wings and tails of adults are usually much worn. The fresh plumage is dull black above with rusty edgings and gray feather tips; below, white spotted with black and veiled with white edgings, the spotting in males so heavy on the abdomen that a black area is produced by loss of the edgings, which wear away rapidly.

The following specimens illustrate this moult, viz.: U. S. Nat. Mus. No. 102142, ♂, March 29, Japan; Am. Mus. Nat. Hist. No. 26962, ♀, March 23, France; No. 45543, ♂, April, California; No. 55008, ♂, April 25, Texas.

The incompleteness of the prenuptial moult, especially in females, is shown by a scattering of winter feathers found on summer birds, and when at the postnuptial moult new feathers are added to those of two other periods of growth, fine opportunity is afforded for those who would theorize about wonderful color changes and restorations.

5. *Second or Adult Winter Plumage* acquired by a complete postnuptial moult, occurring earlier than the postjuvenal of young birds, but in adults as well as young an almost identical plumage is assumed. A bird, U. S. Nat. Mus. No. 102125, ♂, August 14, Petchora River, Russia, retains six old primaries of the nuptial dress and new body feathers are growing, while No. 162593, ♂,

September 7, North China, has renewed the flight feathers and only part of the body plumage. Among the many specimens examined in the gray and white dress, which results from this moult, there are few that can be identified with certainty as adults, both young and old, males and females, being practically indistinguishable in winter dress.

6. *Second or Adult Nuptial Plumage* acquired by a prenuptial moult which does not appear to involve the wings nor the tail with the exception of the tertiaries and a few wing-coverts. What has already been said of the first nuptial plumage applies equally well to the second or third, and the specimens there mentioned may, some of them, be adults. One other that I believe to be an adult (Amer. Mus. Nat. Hist. No. 29888, ♂, April 13, South Carolina) is acquiring new body feathers, the wings, tail and tertiaries much worn.

Two other species that on account of similarity of plumage may well be considered together are the following:

AMERICAN GOLDEN PLOVER (*Charadrius dominicus*).

BLACK-BELLIED PLOVER (*Charadrius squatarola*).

1. *Natal Down.* Mottled above, yellowish below.

2. *Juvenal Plumage* acquired by a complete postnatal moult. Extra-limital specimens of *C. dominicus* in this plumage are the following, viz.; Am. Mus. Nat. Hist. No. 30856, August, Bolivia, and eight birds from Brazil taken between October 5 and November 14. Specimens of *C. squatarola* are the following, viz.: Am. Mus. Nat. Hist. No. 61634, ♂, October 25, France; No. 61633, November 9, Amoy, China; U. S Nat. Mus. No. 119351, ♂, December 26, West Indies.

3. *First Winter Plumage* acquired by a partial postjuvenal moult late in the fall which involves only the body plumage. No. 61634 just cited shows an early stage. The winter dress is deep gray above (yellow-tinged in *C. dominicus*) and chiefly white below, indistinctly mottled on the breast and not differing greatly in the two species.

4. *First Nuptial Plumage* acquired by a prenuptial moult that is

practically complete except perhaps in some females. Only one specimen (*C. squatarola*, Am. Mus. Nat. Hist. No. 39072, ♀, February 27, Florida) shows actual moult of the primaries, this bird having renewed all but the two distal, a few nuptial body feathers are growing, the tail is old. Another specimen of *C. squatarola*, however (U. S. Nat. Mus. No. 161033, February 16, Philippine Islands) has fresh wings and part of the body feathers are new and a specimen of *C. dominicus* (Am. Mus. Nat. Hist. No. 67499, ♀, March 26, Texas) is quite similar although it is possible they are both adults.

The results of this moult may be seen in many spring and early summer specimens, the old gray winter feathers, which are most abundantly retained in females, scattered through the black of the lower parts and less conspicuously on the back among the golden spotted nuptial feathers of *C. dominicus* or the white-tipped ones of *C. squatarola*.

5. *Second or Adult Winter Plumage* acquired by a complete postnuptial moult. Many August and September specimens show new gray feathers creeping in among the dark ones of the nuptial dress, *C. squatarola* apparently beginning to moult earlier than *C. dominicus*. A specimen of *C. dominicus* (Am. Mus. Nat. Hist. No. 30855, August, Bolivia) shows an early stage, neither the remiges nor the rectrices as yet involved, and indicates that these feathers, as in other species, are later than those of the body. It is not surprising that no specimens showing their moult have found their way into collections for winter adults of all species are surprisingly rare.

6. *Second or Adult Nuptial Plumage* acquired by a prenuptial moult which evidently includes the body feathers but apparently not those of the wings and tail. The difficulty of distinguishing adults from young, added to imperfect data, makes me hesitate about citing several specimens with worn flight-feathers that show growth of new body feathers, but the evidence that new body plumage is assumed by moult is conclusive if we examine birds even in worn breeding dress.

A few specimens of *Charadrius pluvialis* indicate precisely the same sequence of plumages and moults here outlined.

It is only a matter of suitable specimens and of time, for the

plumages and moults of other species to be worked out as I have done with the few here recorded, which have been selected to show that natural moult and wear are the cause of plumage differences. The Golden Plover, the Sanderling and the Dunlin have long been cited as proof of strange and wonderful color changes without moult. If there remains now a peg on which to hang such belief, I fail to discover it, and commend to the theorists the facts above presented which they have ignored in constructing their theories. They have started with the eminently unphysiological assumption that a grown feather *can* absorb fresh coloring matter, they have failed to recognize seasonal plumage differences between adults and young, males and females and they have supposed that the parti-colored feathers, which regularly grow on the dividing line between light and dark areas, were in process of recoloration.

In a word they have failed to recognize consecutive moults and their effects, and I trust that my present contribution to the subject will serve to open the eyes of those who imagine they see fresh colors developing in old feathers.

GENERAL NOTES.

Occurrence of the Little Blue Heron in Labrador. — On May 23, 1900, a Little Blue Heron (*Ardea cærulea*) was brought to Mr. Ernest Doane at Lance au Loup, Labrador, by a man who had shot it there a day or two before. Mr. Doane skinned the bird and sent it in a shipment just made to my brother and me. The specimen (No. 4433, Coll. of E. A. & O. Bangs) is a young male just emerging from the white plumage, having some blue feathers in the wings, a few long blue back plumes, and the back, neck and head much intermixed with grayish. While to me, little interest attaches to such wanderers it still, perhaps, is as well to record them, and so far as I know this is the first time the Little Blue Heron, has been taken in Labrador. — OUTRAM BANGS, *Boston, Mass.*

The Marbled Godwit at Pine Point, Maine. — I recently saw for the first time a mounted specimen of the Marbled Godwit (*Limosa fedoa*) which was taken by Mr. Harry Crocker at Pine Point, near Portland, in 1891. Records of this bird in Maine are so few that the following data from Mr. Crocker will be of interest. He writes me: "I killed the bird on either the 8th or 9th of August, 1891. I shot two of them along the shore of the bay at Pine Point. They made no call that I could hear; but, after trying several, I used that of the Yellow-legs, upon hearing which they turned and came towards me. Mr. Benjamin F. Woodward, of Cambridge, Mass., has one of the birds." —NATHAN CLIFFORD BROWN, *Portland, Me.*

The Swallow-tailed Kite at Piermont, New York. — I made an observation this morning (August 22, 1900) that must be of interest. Just at noon, with the sky bright and clear, I stepped out into the yard in time to see a Swallow-tailed Kite (*Elanoides forficatus*) sailing over. The bird passed over me at a height of about one hundred feet and it is quite impossible for me to have been mistaken about the identification. I have seen a number of these birds in the South, and of course have handled the dried specimens. The sun was shining brightly and disclosed all the beautiful details of plumage.

Piermont is on the west bank of the Hudson, and about thirty miles above New York city. — G. L. NICHOLAS, M. D., *Piermont, N. Y.*

The Western Red-tail at Toronto, Canada. — While collecting Hawks north of this city on November 5, 1895, I obtained a good specimen of *Buteo borealis calurus*, male, which is the first time I have heard of this bird appearing in this vicinity. — I. HUGHES. SAMUEL, *Toronto, Ontario.*

Description of the Nestling Plumage of Falco islandus. — While preparing a report on the various collections of birds received by the American Museum of Natural History through the Peary Expeditions to Greenland, I learned from Mr. J. D. Figgins, taxidermist of the expeditions of 1896–97, that Mr. R. D. Perry, one of the members of the expedition of 1897, secured two specimens of *Falco islandus* from the nest. The plumage of the species at that age having a very important bearing on the question of the relationships of the Greenland Gyrfalcons, I wrote Mr. Perry with the result that he kindly forwarded the birds for examination, and with his permission, I append the following description, which applies equally to both specimens:

Crown and nape as in the adult, white with narrow blackish shaft-streaks increasing in width posteriorly; back white, the apical half of the feather with a guttate or elliptical ovate fuscous mark bordered by white, and sometimes continuing as a narrow line down the shaft of its feather to the base; rump white with narrow fuscous shaft-streaks; quills with broken blackish bars and a sub-apical blackish tip, agreeing in pattern with the quills of the adult bird, but with the white portions, especially of the outer web, slightly suffused with pale ochraceous; wing-coverts as in the adult but with the blackish markings linear rather than transverse; tail, about two thirds grown, pure white without bars or other markings; under parts white, as in the adult, with a few fuscous shaft-streaks; under tail-coverts white, unmarked.

In general appearance these birds are quite as white as fully adult individuals and apparently prove that *Falco islandus* is, as has been claimed, white at all ages, and they thus furnish confirmatory evidence of its specific distinctness.

Moulting specimens of *Falco rusticolus* show that the immature, linear-marked plumage is directly succeeded by the mature barred plumage and it is probable, therefore, that the adult plumage of *F. islandus* is acquired in the same manner. — FRANK M. CHAPMAN, *American Museum Natural History, New York City.*

Prairie Horned Larks Nesting in Maine. — In his 'List of the Birds of Maine,' page 82, Mr. Knight says respecting the occurrence of *Otocoris alpestris praticola*: "It is a regular migrant in many parts of the State, and it is not improbable that it may ultimately be found breeding within our State." Its first record of occurrence in the State was made by Mr. James Carroll Meade of North Bridgton (*cf.* Maine Sportsman, April, 1897, p. 6).

The members of the Maine Ornithological Society then naturally looked more carefully to their identifications of Otocoris, with the result, as stated by Mr. Knight in his list, as mentioned above.

In the January, 1900, number of the 'Journal of the Maine Ornithological Society,' page 2, Mr. Arthur H. Norton, of Westbrook, mentions seeing two specimens of Otocoris in Andover, Oxford Co., Maine, which he

believed undoubtedly were of the Prairie variety, but he was not able to make sure, as they took wing before he could train his glass on them.

After this note our members were on the lookout for a definite record of its nesting in the State. The writer had the pleasure of making this record, for on June 26, while driving from Waterville to Pishon's Ferry, on the east side of the Kennebec River, I heard the unmistakable notes of Otocoris. Getting my glass from my traveling case, I alighted from my carriage and went in search of the two birds, which had flown from the road into a field of plowed ground near by. The birds were too wary and could not be approached near enough to decide positively that it was *O. a. praticola*.

Three weeks later, July 17, while driving along the same route, six Horned Larks flew from the road into a cornfield beside the road. Having my glass ready for use, I at once left my team and went in search of them. I flushed them, and farther down the road, I saw several more Larks feeding in the road with the Grass Finches. While examining them with my glass, they flew to a large piece of plowed ground and scattered about. In all there were twelve or fourteen birds, mostly young birds. I then drove to the next house, borrowed a gun and shells loaded with number six shot and went back and shot one adult female and two young. I could not get near enough to get any more adult birds. These proved to be *praticola*, and established a record of their breeding in the State. August 7 (three weeks later), I looked for them at the same place, but was not able to find a bird.

The plowed ground which they frequented was a large patch, that had been plowed in the spring, but being so wet, the owner, Mr. Lowell White, had not planted it, though in July it was dry enough and rather sandy, and well covered in patches with weeds. This field is situated about one half mile from the Kennebec River, in Kennebec County, bordering Somerset County. There are large fields of sandy land, and it is a typical location for *Otocoris alpestris praticola* to nest. — J. Merton Swain, *Portland, Me.*

The European Linnet in Westchester County, N. Y. — Several years ago — in the late autumn or early winter of 1894 — I secured an adult female European Linnet (*Acanthis cannabina*), at Scarboro', N. Y., two miles south of Sing Sing. The bird was shot from the top of a maple tree, in a field about a mile east of the Hudson River. For several days previous to this I had frequently seen and heard in the region a small flock of very peculiar Linnets, which were undoubtedly of the same species, as I several times saw them at short range. There were about five in all, two or three being red-breasted, russet-backed males. They were most often seen alone, but not infrequently associated with flocks of American Goldfinches.

As far as I remember, the female was, when shot, the only Linnet among several Goldfinches, and the other Linnets were not seen thereafter. The bird secured was in bright, unworn plumage, and this fact, combined

with that of the presence of others of the species, makes it unlikely that it was an escaped cage-bird. It was identified by Dr. Allen and Mr. Chapman, and is preserved in my father's collection.

So far as I know, this species has not been introduced into this country, though it is always possible for such birds to fly aboard trans Atlantic liners at sea, and stay with them to the end of the voyage. It is probably by this means that most of the stray European land birds get to America, and *vice versa*.

Dr. Marcus S. Farr, of the New York State Museum, advises me to record this occurrence in 'The Auk,' even at this late date.—GERALD H. THAYER, *Monadnock, N. H.*

The Rough-winged Swallow breeding in Connecticut, and other Notes. — On June 17, 1900, I secured a male Rough-winged Swallow (*Stelgidopteryx serripennis*) which was flying about a little brackish pond by the Thames River, near Gales Ferry. Later, on June 23, I found in a neighboring railroad embankment two nests of this species. Both were dug into the bank about an arm's length and just under the overhanging sods and roots. One of the nests, which I examined carefully, contained five pin-feather covered young. The parents were seen circling nervously about, all four being present, which led me to believe another nest must be in the vicinity, which I failed to discover.

I found also two male Hooded Warblers (*Wilsonia mitrata*) on the Gales Ferry side of the river on June 23 and 24, opposite the Montville shore where I found a single bird last June (see Auk, XVI, 1899, p. 360); these two birds were singing among the mountain laurel bushes on the southern hillsides. I also found a single male Worm-eating Warbler (*Helmitherus vermivorus*) singing in the same locality on June 23, and secured him on the 24th. A pair of Mourning Doves (*Zenaidura macroura*) were seen on June 17, feeding along the beach at Gales Ferry. — REGINALD HEBER HOWE, JR., *Longwood, Mass.*

The Proper Name for the Florida Yellow-throat. In 'The Auk' for July 1, 1900 (p. 225), Mr. William Palmer adopts Audubon's name *roscoe* for the southern form of the Maryland Yellow-throat because, to quote from his paper, "there can be no question as to the Florida bird occurring along the Gulf Coast"; and also, because the type specimen was "taken in a cypress swamp." The first reason is a matter of opinion as yet unconfirmed by specimens and, in the event of its being substantiated, of little value, under the circumstances. The second reason is an excellent one for the rejection of the name *roscoe* for the resident bird.

The Florida Yellow-throat, is, so far as my experience goes, by no means a common bird. In Florida, during the winter, it is doubtless outnumbered by *trichas* by at least fifty to one. I have invariably found it in or near growths of scrub palmetto, whence the local name 'Palmetto Bird.'

Audubon's type of *roscoe* was an immature bird, of which he wrote: "Not long after the publication of my first volume, I discovered the error which I had committed in making the bird represented in my twenty-fourth plate a new species, it being only the young of *Sylvia trichas* of Latham" (Orn. Biog. V, 463). It is true that Audubon might have described the young of the resident bird, and hence, therefore, of the Florida Yellow-throat which, Mr. Palmer states with such positiveness, occurs "along the Gulf Coast." Audubon's type, however, was taken in western Mississippi in September, the month when the southward migration of *trichas* reaches its height, and, furthermore, was shot from "the top branches of a high cypress" (Orn. Biog. I, 124)—facts which, to my mind, essentially prove it to have been a representative of the northern and not of the resident bird, for which latter, therefore, we are not qualified in adopting the name *roscoe*. — FRANK M. CHAPMAN, *American Museum of Natural History, New York City.*

The Mockingbird at Barnegat, N. J., and on Long Island, N. Y. — On August 25, while in the vicinity of Barnegat, N. J., I was surprised to see a pair of wild Mockingbirds (*Mimus polyglottos*), and on inquiry I found a man who said he had heard a Mockingbird singing several times during the spring and early summer. On the following day I saw another Mockingbird, presumably one of those I had seen the day previous, as it was near the same locality.

On August 27, at Floral Park, L. I., I saw a strange bird light on the top of one of the full-grown maple trees that line the avenue along which I was walking. Before I had approached very near the bird again took wing and from the manner of its flight, its size, and prominent white patches upon its wing, I am confident that it was a Mockingbird. While the distance was rather great to identify it absolutely, I know of no other bird which could have shown such wing color, except the Red-headed Woodpecker, but its manner of flight was not that of the Woodpecker, and we certainly would not expect to see a Woodpecker perched on the top branches of a tree like a Robin. — JOHN LEWIS CHILDS, *Floral Park, Long Island, N. Y.*

Brief Michigan Notes. — Cook, in his Birds of Michigan, records Baird's Sandpiper and Gray-cheeked Thrush as rare in the State. As a matter of fact both are common migrants here. My acquaintance with the Sandpiper (*Tringa bairdii*) dates from 1890. I collected about twenty-five specimens during July and August of that year, and noticed several hundred. They make their appearance the latter part of July and are rarely seen after September 1. They prefer the Least and Semi-palmated Sandpipers for companions but I have often observed them among flocks of the Pectoral Sandpiper, Lesser Yellow-legs and Killdeer. The Gray-cheeked Thrush (*Hylocichla aliciæ*) arrives from the north about a week

earlier than the Olive-back and remains a week later, overlapping the Hermit by two or three days.

September 27, 1893, I shot a fine male Nelson's Sparrow (*Ammodramus nelsoni*). When first seen it was in company with a pair of Savanna Sparrows. The three were bathing in a little pool on a mud flat. Later it flew to a reed top and commenced drying its feathers. This taking to a reed top was unusual and resulted in its death.

September 4, 1899, I shot a Knot (*Tringa canutus*) in immature plumage. It came straight in from the lake and perched on a boulder about 300 feet from shore. This was near the town of Port Austin, Huron County. The local hunters called it a young 'Robin Plover' and did not consider it rare.

In June, 1899, my brother added the Black-throated Blue Warbler (*Dendroica cærulescens*) to the list of birds breeding here. I have never personally observed this species in summer, but have found the Black and White (*Mniotilta varia*), Golden-winged (*Helminthophila chrysoptera*) and Cerulean (*Dendroica cærulea*) to be common breeders, and am sure the Sycamore (*D. dominica albilora*) breeds although no nests have yet been discovered.

During ten years of careful field work I have seen the Cardinal Grosbeak (*Cardinalis cardinalis*) but twice and secured both specimens — female, November 1, 1897, and male, December 3, 1899. — J. Claire Wood, *Detroit, Michigan.*

List of the Rarer Birds met with during the Spring of 1900 in the Immediate Vicinity of Toronto. — The following list of the rarer birds which came under my personal observation while taking field notes during the past season in the immediate vicinity of Toronto may be of interest to other observers.

May 8. Cape May Warbler (*Dendroica tigrina*), 1 male seen.
" 9. " " " " " 1 male taken.
" 10. " " " " " 1 male taken.
" 11. Prairie Warbler (*Dendroica discolor*), 1 male taken.
" 12. Orange-crowned Warbler (*Helminthophila celata*), 1 male taken.
" " " " " " 1 female taken.
" 13. Tennessee Warbler (*Helminthophila peregrina*), seen.
" 15. Black-poll Warbler (*Dendroica striata*), 3 males seen.
" 16. Kirtland's Warbler (*Dendroica kirtlandi*), 1 male taken.
" 18. Cape May Warbler (*Dendroica tigrina*), 1 male taken.
" " Black-poll Warbler (*Dendroica striata*), males plentiful.
" 19. Orchard Oriole (*Icterus spurius*), 1 male taken.
" " " " " 1 female seen.
" 20. Cape May Warbler (*Dendroica tigrina*), 1 male seen.
" 21. Tennessee Warbler (*Helminthophila peregrina*), 2 seen.
" 22. " " " " 25 or more seen and three taken.

May 22. Black-poll Warblers, very abundant from this date till June 2.
" " Connecticut Warbler (*Geothlypis agilis*), 1 male taken.
" 23. " " " " 1 male taken.
" 24. Tennessee Warbler (*Helminthophila peregrina*), 1 female taken.
" " Connecticut Warbler (*Geothlypis agilis*), 1 male taken.
" 26. Black-poll Warbler (*Dendroica striata*), 1 female taken.
" 27. Connecticut Warbler (*Geothlypis agilis*), 2 males seen.
" 28. " " " " 1 female taken.
" 30. " " " " 1 female seen.
" " Mourning Warbler (*Geothlypis philadelphia*), 1 male seen.

June 1. Yellow-bellied Flycatcher (*Empidonax flaviventris*), 1 female taken.

June 2. Orchard Oriole (*Icterus spurius*), 1 male seen.
" 4. " " " " 1 male taken and another male seen.

June 9. Orchard Oriole (*Icterus spurius*), 2 males seen.
July 5. " " " " a pair nesting.

Respecting the above, the records for *Dendroica discolor* and *D. kirtlandi* are the first, so far as I can ascertain, for this locality; and *Icterus spurius*, while recorded once or twice before from as far east as this in Canada, I believe this to be the first record of its nesting. — I. Hughes Samuel, *Center Island, Toronto, Canada.*

RECENT LITERATURE.

Beyer's 'The Avifauna of Louisiana.'[1] — This is the first attempt at an enumeration of the birds of the State of Louisiana, and is therefore a most welcome contribution to our knowledge of the distribution of the birds of the Gulf Coast. It is the result, the author tells us, " of personal observation and collecting during fully sixteen years within the limits of our State. In the pursuit of the study of ornithology I have visited nearly every section of the State at different seasons of the year, and in this way learned to understand the variation of bird-life effected by the

[1] Louisiana Herpetology, with a Check-list of the Batrachians and Reptiles of the State, and the Avifauna of Louisiana, with an Annotated List of the Birds of the State. By George E. Beyer, Tulane University. Reprinted from the Proceedings of the Louisiana Society of Naturalists, 1897–1899. New Orleans, La., 1900. (Birds, pp. 1–45 of reprint.)

annual spring and fall migration." The list proper is preceded (pp. 3–8) by a very detailed account of the physical conditions of the region, the varied topography giving rise to a number of markedly different areas, although the higher portions of the country, in the northwestern part of the State, do not exceed an elevation of four hundred feet. The list numbers 323 species and subspecies, and a list of 22 others is given as of probable occurrence, several of which we are surprised to see lack confirmation as inhabitants of the State. The annotations are for the most part brief, but add greatly to the value of the paper, stating fully the manner of occurrence of the birds as known to the writer. While the nomenclature of the A. O. U. Check-List is followed, the changes in names made in the last (ninth) Supplement are not adopted, the paper having been presented for publication in March, 1899, though not printed till a year or more later. The information conveyed in the present list concerning the species that breed in the State is especially important, and helps to define at least where many of our common northern species do not breed. It is surprising, however, to find that the White-bellied Swallow (*Tachycineta bicolor*) "occurs everywhere in the State, and at all times of the year." The Burrowing Owl (*Speotyto cunicularia hypogæa*) is stated to be "quite numerous on the prairies, and it undoubtedly breeds there as well." Probably the identifications of a few of the species will bear revision, as the Horned Larks, the Seaside Sparrows, and the Prairie Hen, which latter is most likely the subspecies *attwateri*. The list evinces, however, careful and conscientious work and is a most welcome and exceptionally important addition to our list of faunal papers. — J. A. A.

Burns's 'A Monograph of the Flicker.' [1] — In his praiseworthy monograph Mr. Burns presents the results of his devotion to the study of this species "the leisure moments of five years," with "the generous aid of a large corps of enthusiasts." Although the literature of the subject has been extensively utilized, the monograph is based to a large extent upon the author's own observations and those of his many correspondents, and is therefore to a large degree new material. The paper gives first the names of the species, both technical and vernacular, with an account of their probable origin and significance, the vernacular names alone, including their variants, numbering at least one hundred. Then follows a detailed treatment of all the principal incidents of the birds' natural history, as its geographical distribution, migrations, manner of flight, roosting, 'drum calls,' its varied notes, calls and song period, mating, nesting habits, eggs, molt, food, enemies, etc., even to hybridism and atavism. In short, the eighty-two pages constituting the 'Monograph' are well

[1] A Monograph of the Flicker (*Colaptes auratus*). By Frank L. Burns. The Wilson Bulletin, No. 31, April, 1900, pp. 1–82. Price, 50 cts.

filled with well-selected matter, and go far toward answering every important inquiry respecting the life-history of this notable species. — J. A. A.

Nash's 'Check-List of the Birds of Ontario.'[1] — Mr. Nash's briefly annotated list of the birds of Ontario numbers 302 species, and is based on the author's personal knowledge, except where credit is given to other authority. It cannot fail to be a very useful and convenient summary of the ornithology of the Province, and is very neatly and correctly printed. — J. A. A.

Macoun's 'Catalogue of Canadian Birds.'[2] — The scope and character of Mr. Macoun's 'Catalogue of Canadian Birds' is thus succinctly stated in Dr. George M. Dawson's prefatory note, namely: "It is intended to enumerate all of the birds of the Dominion systematically and to bring together the principal known facts in regard to their distribution, migrations and breeding habits." In the author's preface he further states that the 'Catalogue' is to also include "Newfoundland, Greenland and Alaska," or the whole of North America north of the United States. "The nomenclature and the numbers given in the latest edition and supplements of the Check-list published by the American Ornithologists' Union have been made the basis of arrangement of the catalogue." It would have been advisable to have also added a separate and consecutive series of numbers for the species of the 'Catalogue.' Part I includes Nos. 1 to 316 of the A. O. U. Check-List, and takes in rather more than four fifths of all the species.

The first enumeration of the birds of this extensive region is that contained in the second volume of the 'Fauna Boreali-Americana' of Swainson and Richardson, published in 1831, which contained 267 species. In 1878 a second enumeration was made by Mr. Montague Chamberlain, restricted however to Canada, and thus excluding Alaska and Greenland, the number of species being 556.

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[1] Check List | of the | Birds of Ontario | and | Catalogue of Birds in the Biological Section | of the | Museum. | Department of Education | Toronto. | [By C. W. Nash.] Toronto: | Warwick Bro's. & Rutter, Printers, Etc., 68 and 70 Front St. West. | 1900. — 8vo, pp. 58.

[2] Geological Survey of Canada. | George M. Dawson, C. M. G., L. L. D., F. R. S., Director. | — | Catalogue | of | Canadian Birds. | — | Part I. | Water Birds, Gallinaceous Birds, | and Pigeons. | Including the following Orders: | Pygopodes, Longipennes, Tubinares, Steganopodes, | Anseres, Herodiones, Paludicolæ, Limi- | colæ, Gallinæ, and Columbæ. | — | By John Macoun, M. A., F. R. S. G., Naturalist to the Geological Survey of Canada. [Seal.] Ottawa: | Printed by S. E. Dawson, Printer to the Queen's Most | Excellent Majesty, | 1900.—8vo, pp. vii+218. Price 10 cts.

The present 'Catalogue' is based largely on the work of the Canadian Geological Survey, Mr. Macoun having been collecting notes and observations for this work since 1879, while Mr. Spreadborough has been similarly engaged since 1889, under Mr. Macoun's supervision. Their journeys have extended to various parts of this wide area, from Newfoundland and Labrador to British Columbia and Vancouver Island. The unpublished notes of many other observers have also been utilized, as well as the literature of the subject. For Alaska, Greenland, Labrador, and Arctic Canada the 'Catalogue' is based almost entirely upon previously published observations, and even for Southern Canada, the published contributions of Downs, Chamberlain, McIlwraith, Dionne, Wintle, Seton-Thompson, Fannin, and others are freely cited. There are thus brought together under each species the principal known facts of its distribution, with usually a paragraph headed 'Breeding Notes,' with a list of the specimens in the Ottawa Museum, collected by the Survey. The 'Catalogue,' containing, as it does, such a large amount of previously unpublished matter, combined with a summary of the more important previously published records, forms a compendium of ornithological information for the northern half of North America of great permanent interest and value. It is proposed to complete Part II the coming winter; and the author invites ornithologists who may receive Part I, to send him any additional facts on the birds contained therein with a view to their publication as a supplement to Part II. — J. A. A.

Proceedings of the Delaware Valley Ornithological Club.[1] — Besides the minutes of the meetings, which contain many records of interesting captures and notes of field work, are two papers published in full. These are: (1) 'Migration Data on City Hall Tower,' Philadelphia, by William L. Baily, which concludes with a tabular list of 56 species of birds that were killed by striking the lighted tower from August 27, 1897, to October 31, 1899. The number of individuals was 527, of which 452 were killed from August 23 to October 31, 1899. (2) 'The Summer Birds of the higher parts of Sullivan and Wyoming Counties, Pa., by Witmer Stone. This is a briefly annotated list of 98 species. Mr. Stone states: "The boreal element in the avifauna of Pennsylvania has been steadily decreasing for a number of years past as the primitive hemlock and spruce forest disappears before the advance of the lumberman. . . . The cutting of the timber and the fires which so frequently follow totally change the aspect of the country and completely exterminate many boreal plants, while the altered conditions admit of the introduction of a more southern fauna, as evidenced

[1] Abstract of the Proceedings of the Delaware Valley Ornithological Club of Philadelphia. No. III. For the years 1898 and 1899. Published by the Club. 1900. 8vo., pp. 28.

by the presence of late years of the Cottontail Rabbit, Quail, Towhee, Indigo Bird, Yellow Warbler, Thrasher, Chat, etc."—J. A. A.

Cooke's 'Further Notes on the Birds of Colorado.'[1]—This is a 'Second Appendix' to Prof. Cooke's 'The Birds of Colorado,' published in 1897, this, and the 'First Appendix,' published in 1898, being paged continuously with the original catalogue. Several species are here added to the list of Colorado birds, making the number 387, of which 243 are known to breed. This is an addition of about 25 species during the three years since the publication of the original list. Many notes are also added respecting the distribution and breeding ranges of other species. Much space is given to notes based on the study of the collection of Colorado birds made by the late Edwin Carter, representing "the work of Mr. Carter for more than thirty years. Much of the material was gathered in the immediate vicinity of Breckenridge, and the rest in Middle Park and South Park," at altitudes of 7500 to 9500 feet. The 'Bibliography of Colorado Ornithology' is continued to date.

As showing the progress made in the study of Colorado birds, Prof. Cooke remarks (p. 220): "There are twenty-five Warblers given in the last edition of the A. O. U. Check-List whose range is said to be 'Eastern United States,' or 'Eastern United States to the Plains,' thus not including Colorado in their habitat," of which eleven have now been found in Colorado, and Prof. Cooke expects that the other fourteen will yet be found in that State. This large appendix of nearly 60 pages is provided with an index, and merits the high praise we gave the original catalogue (*cf.* Auk, XIV, 1897, pp. 331, 332).—J. A. A.

Economic Ornithology.—In the last number of this Journal (XIII, pp. 314, 315) attention was called to Dr. T. S. Palmer's important contribution to the subject of Bird Protection, forming Bulletin No. 12 of the U. S. Department of Agriculture, Division of the Biological Survey. This was promptly followed by Circular No. 28 of the Division of the Biological Survey, also by Dr. Palmer, consisting of a 'Directory of State Officials and Organizations concerned with the Protection of Birds and Game,' giving a list of the Fish and Game Commissioners of each State, and of each of the Provinces of Canada; also a list of National and State Organizations interested in this work, including their officers and wardens, with their addresses; and also a list of the Audubon Societies, organized especially for the study and protection of birds, with the addresses of their Secretaries.

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[1] Further Notes on the Birds of Colorado. By W. W. Cooke. Bulletin 56 (Technical Series No. 5), Agricultural Experiment Station of the Agricultural College of Colorado, May, 1900, pp. 181–239.

This was immediately followed by the Biological Survey Circular No. 29, issued over the signature of the Hon. James Wilson, Secretary of the Department of Agriculture, which deals with the Lacey Act. The Circular is entitled 'Protection and Importation of Birds under Act of Congress approved May 25, 1900.' It gives the text of the act, and explains in detail its various provisions, as relating to (1) Propagation and Distribution of Birds; (2) Importation of Foreign Animals and Birds; (3) Transportation of Prohibited Species; (4) Interstate Traffic in Animals or Birds killed or shipped in violation of State Laws; (5) Preservation and Importation of Birds in Charge of the Biological Survey. "The object," it is stated, "of placing this work in charge of an Executive Department of the Federal Government was merely to supplement and not to hamper or replace the work hitherto done by State commissions and organizations; in other words, to coordinate and direct individual efforts, and thus insure more uniform and more satisfactory results than could otherwise be obtained. Greater uniformity in State legislation and better enforcement of existing laws can be secured only by the most complete cooperation between the forces now at work in the cause of bird protection."

The importation of the English or European House Sparrow and the Starling is absolutely prohibited, as is also their "deliberate shipment" from one State to another.

By this special order of the Secretary of Agriculture, "the Division of the Biological Survey is hereby placed in charge of all matters relating to the preservation and importation of animals and birds under this Act, and until further notice the Assistant Chief of that Division [who fortunately is Dr. T. S. Palmer] will have immediate charge of the issue of permits for the importation of animals and birds from foreign countries. All inquiries regarding bird protection and all requests for publications on the uses or preservation of birds should be addressed to the Chief of the Biological Survey."

Another publication requiring notice in the present connection is Dr. Palmer's 'A Review of Economic Ornithology in the United States,' published in the 'Yearbook' of the U. S. Department of Agriculture for 1899 (pp. 259, 292). In this important paper the scope and purpose of 'economic ornithology' is defined, followed by a brief historic sketch of the 'development of American ornithology,' and comments on the following topics: 'Investigations as to the Value of Birds'; the 'Commencement of Investigations along Modern Lines,' 1858 to 1880; and 'A Period of Notable Advance in Investigations,' covering the period from 1880 to the present time, exclusive of the work of the Biological Survey, begun in 1885. He says, in summing up the principal results due to the work of individual investigators: "The important researches thus briefly noticed include four investigations on the Robin, an examination of 630 Nebraska birds [by Prof. Samuel Aughey in 1878], about 1,600 Wisconsin birds [by Prof. F. H. King in 1882], and an investigation of 2,084 birds of

prey, Grackles and other species in Pennsylvania [by Dr. B. H. Warren in 1886], comprising in all more than 5,000 stomachs."

In recounting the work of the Biological Survey he gives an account of the establishment of the Division, its first publications, its functions from the standpoint of economic ornithology, and the results of its investigations, (1) regarding supposed injurious birds, (2) regarding beneficial birds, and (3) a summary of the results of its fourteen years' work.

He then takes up the subject of the 'Commercial Uses of Birds,' and under the subheadings 'Game,' 'Eggs,' 'Feathers,' and 'Guano,' gives some very startling statistics respecting the slaughter for the market of such birds as the Prairie Chicken and Passenger Pigeon, and the enormous destruction of the eggs of Gulls and Terns, Murres, Guillemots and Albatrosses, for commercial purposes, and of Terns and Herons for their plumage. The trade in Guano is not necessarily destructive to the birds to which its deposition in such vast quantities is due; but the statistics here given are of great interest, both from a commercial and an ornithological point of view. A map showing the principal Guano Islands in the Pacific Ocean "bonded under Act of 1856" for citizens of the United States, illustrates this portion of Dr. Palmer's article. "During the thirty years from 1869 to 1898, 283,871 tons of guano, valued at $3, 229,832, were brought from islands appertaining to the United States."

The paper concludes with a consideration of 'Measures for the destruction, Preservation, and Introduction of Birds.' Under this head are given the history and results of 'bounty laws,' 'game laws,' 'criticism of game laws,' 'efforts at uniformity in game laws,' 'special restrictions,' and 'prospect for enforcement of game laws.' Also a brief summary is given of the introduction of foreign birds and its results.

In concluding this notice of Dr. Palmer's excellent paper it may interest many readers of 'The Auk' to know what led to the establishing of the Division of the U. S. Department of Agriculture known at present as the Biological Survey — a branch of the official work of the Government now so far-reaching in its relations, not only in respect to economic ornithology, but to scientific ornithology and mammalogy. Dr. Palmer says: "One of the most important results of the organization of the American Ornithologists' Union was the impetus given to the study of economic ornithology. Committees on the English Sparrow, bird migration, and geographical distribution were appointed at the first meeting, and elaborate investigations were at once begun. The work, however, had been planned on such a large scale that it soon outgrew the resources of the committees, and at the second annual meeting of the union it was determined to present a memorial to Congress to secure an appropriation for continuing it.....In recognition of the importance of the work, Congress granted an appropriation of $5,000, to be expended under the division of Entomology of the Department of Agriculture, and on July 1, 1885, established a section of economic ornithology. Under the direction of Dr. C. Hart Merriam investigations were outlined on a broad scale, to

include the 'food habits, distribution, and migrations of North American birds and mammals in relation to agriculture, horticulture, and forestry.' A year later the section became an independent division, and in 1896 its name was changed by Congress to the broader title of Division of Biological Survey."—J. A. A.

Meyer and Wiglesworth's 'Birds of Celebes.'[1]—We take great pleasure in bringing to the notice of the readers of 'The Auk' this excellent monograph of the 'Birds of Celebes,' in two large quarto volumes of over 1100 pages, beautifully illustrated with nearly 50 colored plates. It embodies the results of many years of work by experts in this particular field, the senior author, Dr. A. B. Meyer, the eminent Director of the Dresden Museum, having spent several years (1870–73) in Celebes collecting the materials for this long-contemplated work. He has thus not only the advantage of thoroughly knowing the physical conditions of the region, but of having made the personal acquaintance of many of the species in life. His valuable 'Field Notes on the Birds of Celebes' appeared in 'The Ibis' for 1879, and were followed by a long series of special papers on the birds of the East Indian Archipelago.

The region here included as the 'Celebesian area' embraces "The Talaut Islands in the north, the Sulu Islands in the east, and the Djampea Group in the south. . . . . The boundary so chosen adjoins to the north the southern limit of the Philippines, as defined by Tweeddale, Worcester and Bourns, and others; to the east it coincides with Salvadori's western border, as drawn in his 'Ornitologia della Papuasia e delle Molluchi, and by other writers; to the south it takes in all the islands between Celebes and the Lesser Sundas. The book may thus be said to fill up an ornithological gap, and the bounds as chosen appear also to be the most natural, except possibly in the case of the Djampea Group." The number of species included is 393, with about 150 additional subspecies, each being treated fully as regards its bibliography, its plumages and relationships, its geographical distribution and life-history, so far as the details are known. The numerous colored plates give for the first time adequate illustrations of the 70 species here figured.

The 'Introduction,' occupying 130 pages, treats subjects of general interest, as the 'Travel and Literature' of the region (pp. 2–16); the 'Seasons and Winds in the East Indian Archipelago' (pp. 17–37); 'Migration in the East Indian Archipelago' (pp. 38–52); 'Variation,' in its five phases of (1) individual variation, (2) geographical variation, (3)

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[1] The | Birds of Celebes | and | the Neighboring Islands. | By | A. B. Meyer and L. W. Wiglesworth. | — | With 45 Plates (42 coloured) and 7 coloured Maps. | — | Berlin: | R. Friedländer & Sohn. | 1898. — 2 vols. 4to. Vol. I, pp. i–xxxii + 1–130 + 1–392, pll. 17 (14 col.) and 7 col. maps; Vol. II, 2 ll., pp. 393–962, pll. vol. 28.

seasonal changes, (4) sexual differences, and (5) changes depending upon age' (pp. 53–79); and 'Geographical Distribution' (pp. 80–130). 'Migration,' 'Variation,' and 'Geographical Distribution' are discussed from the broadest standpoint and with admirable conservatism. Migration proper, though occurring to only a limited extent, is well-marked in the Indian Archipelago, but through lack of competent resident observers its details are to a large extent unknown. In referring to the local movements of certain species of Pigeons at particular seasons the following may be of interest: "For the sake of the general reader, who may be apt to suppose that narrow straits of the sea offer no barrier to the geographical distribution of tropical species, it may be mentioned that, so far from this being the case, there is reason to believe that resident species never, or very exceptionally, cross the sea; were it otherwise the species would not be found with such restricted ranges as is actually the case."

Under the subheading 'Hereditary effects of shelter and exposure' (pp. 73–79), an attempt is made to explain the origin of racket-tail-feathers and other similar modifications of the plumage, which are believed to be due to "the inherited results of attrition."

'Wallace's line' is considered at length under 'Geographical Distribution,' the views of previous authors cited respecting it, and the conclusion reached that, in our present state of knowledge of the question it is a "waste of time to speculate on it with the help of an up-and-down system for the islands and continents, just as required." The distribution of the Celebesian birds is tabulated and the relationships of the avifauna of Celebes as a whole and of the several lesser groups of islands is considered at length. "The results of our study of the birds of Celebes," say these authors, "as well as of those of the countries around, is that by its avifauna Celebes has far stronger connections with the Philippines than with any of the neighboring lands, and that the relation of its birds with the Oriental Region is more than twice as strong as with the Australian Region."

In regard to methods of nomenclature in the case of subspecies, the authors, while freely employing trinomials for such forms, are not fully satisfied that some better system may not be devised. They say: "Perhaps in future — when the want becomes sufficiently pressing to necessitate such a step — a somewhat considerable change in the nomenclature of the present day may be effected as follows: species as at present defined will remain under their original binomials; subspecies under trinomials; but the degree of relationship between the interconnecting forms to these subspecies will be displayed by the use of numbers — somewhat after the manner of chemical formulæ. Thus, in the case of *Haliastur indus* — taking four degrees of relationship into consideration — the typical subspecies will be *Haliastur indus typicus*, that of New Guinea *H. indus girrenera*; that of Celebes, which may be supposed to have three times as strong a connection with *girrenera* as with typicus, will be represented as *H. indus*$_1$ *girrenera*$_3$; that of Java being just about midway in charac-

ters as *H. indus*$_2$ *girrenera*$_2$; that of Malacca as *H. indus*$_3$ *girrenera*. This method could be carried to any degree of refinement, and is certainly less complex than the use of a quadrinomial such as *Haliastur indus girrenera ambiguus*," — the latter a name applied to the New Guinea form by Brüggeman. They add in a footnote: "We are not so sanguine as to believe, that our brother ornithologists will adopt our innovations of nomenclature, but we trust that future 'rules of nomenclature' will also take into consideration cases like this, and make some proposition which can be generally adopted." The suggestion is worthy of consideration, as the matter is one with which other workers have had to struggle, though as yet they have hardly dared to introduce innovations respecting it.

As a source of general information on the birds of Celebes and neighboring islands, this admirable work will ever remain an authority, not only on the technicalities of the subject but on the habits and distribution of the species. — J. A. A.

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CORRESPONDENCE.

Habits of the Goony, and Notes on Variability of Birds' Songs.

EDITORS OF 'THE AUK':—

Dear Sirs:—In his interesting paper on the 'Occurrence of American Birds in Hawaii, in the July Auk (Vol. XVII, pp. 201–206) Mr. Henshaw, writing of the Brown Gooney (Gony ?), *Diomedea chinensis*, records "the added fact that the Goonies also roost upon the vessel's yards at night." Is this a fact ? My observations tend to a different conclusion. In several voyages on the Pacific I have noticed that these Albatrosses, early in the morning, invariably came from far astern of the ship, indicating that they had been resting on the water during the night. Although a cold-sea bird, they not infrequently follow a vessel many miles into the tropics.

May I advert to another item, on page 305 ? In the notice of 'Oberholser on Birds from Santa Barbara Islands, California,' a quotation is given praising the striking vocal performances of the Western Meadowlark (*Sturnella magna neglecta*). An editorial comment expressing non-agreement with Mr. Oberholser's conclusion is added. Mr. Oberholser is not alone in his admiration for the song of this species — or subspecies. Mr. Ernest Seton-Thompson, in one of his charming descriptions, is enthusiastic over the rapturous music this bird pours forth. In the many years I have known it, I never heard any note finer than the somewhat husky whistle, that was not to be compared, so I thought, with the clear flute-like carol of the Eastern Meadowlark. The question arises — may there not be individuals of surpassing vocal powers?

While in Nova Scotia the past summer I saw and heard a Robin singing in a strain unlike anything I had ever listened to from a Robin before. There was, it is true, the unmistakable Robin song, but it was strangely wild and glorified. There, too, was the bird, only of darker head and ruddier breast it seemed, as befitted this exceptional singer. Some writer — perhaps Mr. Torrey — has told us of local differences in voice in the case of the familiar *Merula migratoria*. May there not be still greater differences among individuals of certain forms? Baltimore Orioles may be cited as an instance in favor of this view.

G. S. MEAD.

San Francisco, Cal.,
August 18, 1900.

NOTES AND NEWS.

HEREAFTER, until further notice, 'THE AUK' will be issued from Cambridge, Mass., instead of from New York, its distribution having been placed in the hands of Mr. E. W. Wheeler, who for many years past has been 'The Auk' printer, to whom communications concerning subscriptions should be sent, addressed, Edward W. Wheeler, Printer and Publisher, 30 Boylston Street, Cambridge, Mass. Manuscripts intended for publication, books, and pamphlets for review, and all exchanges, should be sent, as heretofore, to the Editor, American Museum of Natural History, New York City, N. Y.

THE EIGHTEENTH ANNUAL CONGRESS of the American Ornithologists' Union will be held in Cambridge, Mass., beginning on the evening of November 12, 1900. The evening session will be for the election of officers and members and the transaction of the usual routine business. Tuesday and the following days, the sessions will be for the presentation and discussion of scientific papers, and will be open to the public. Members intending to present communications are requested to forward the titles of their papers to the Secretary, Mr. John H. Sage, Portland Conn., so as to reach him not later than November 8. The sessions will doubtless be held in one of the lecture halls of the University Museum.

In connection with this Congress of the Union it is proposed to hold a conference of representatives of the Audubon Societies, who will be sent as authorized representatives of their respective Societies, for the purpose of establishing a closer relationship between the Societies and the Union, and to consider ways and means for the more systematic prosecution of the work of the Societies.

Mr. CHARLES C. MARBLE, an Associate Member of the American Ornithologists' Union, died at his home in Chicago, September 25, 1900, of heart disease, at the age of 52 years. Mr. Marble was until recently editor of the illustrated magazine 'Birds,' so well known as a popular magazine of ornithology. He was a native of Ohio and moved to Chicago in 1893.

AS DOUBTLESS known to many of our readers, Mr. Robert Ridgway has been engaged for some time in the preparation of a work on 'The Birds of North and Middle America,' the first volume of which is now ready for the printer. In reference to this, doubtless the most important work on American birds ever undertaken, we are permitted to give the following interesting information, kindly furnished at our request by Dr. Charles W. Richmond:

In September, 1894, Mr. Ridgway undertook, by direction of the Assistant Secretary of the Smithsonian Institution, the preparation of a treatise

on the ornithology of North and Middle America, and now, after six years of preliminary work, the first volume is ready for the printer, and has been placed in the hands of the publication committee of the National Museum.

The work is based mainly on the collections of the U. S. National Museum, but much additional material has been consulted in the large museums and private collections throughout the country. It will probably run through seven octavo volumes, of about 600 pages each.

About 3000 species and subspecies will be dealt with, accompanied by full descriptions, to which will be added the geographical distribution and synonymy of each. The synonymy, already completed, has been compiled with great care, special pains having been taken to verify each reference, giving the exact orthography of the original citation, and no references have been included which do not deal with some important fact in the distribution, life history, or status of the species. The type locality and location of the type of each species will be given, when known.

The general plan of the work will be similar to that of the recently published 'Fishes of North and Middle America,' by Jordan and Evermann; but owing to the more extensive literature of birds the synonymy will be of greater length.

Keys will be given for families, genera, and species, including all extralimital American families; in the case of genera and species extralimital members will be included only when few in number, when a brief synonymy will be given in footnotes.

Outline drawings of generic details of all genera included in the work will be given, similar to those in the author's 'Manual.' The geographical limits will be the entire continent of North America down to the southern extremity of the Isthmus of Panama, including the West Indies, isolated Caribbean islands, and Curaçao, Aruba, and Bonaire; also the Galapagos group.

The second volume is well under way, and will be ready for the printer about the end of the year. Much progress has been made on the remainder of the work, such as the synonymy, keys to families, sequence of subjects, etc., and it is expected that volumes will be completed at the rate of about one a year.

R. H. PORTER, the well known London publisher, announces as ready for publication an important work by Richard M. Barrington, entitled, 'The Migration of Birds as observed at Irish Lighthouses and Lightships, including the Original Reports from 1888–97, now published for the first time, and an Analysis of these and of the previously published Reports from 1881–87. Together with an Appendix giving the measurements of about 1600 Wings.' The work will form a thick octavo volume of 980 pages, and the edition will be limited to 350 copies. The price will be 25s net.

We are glad to be able to announce that the second volume of the late Dr. Stark's 'Birds of South Africa' (R. H. Porter, London) is being prepared for publication by Mr. W. L. Sclater, from materials gathered by Dr. Stark. As shown by our notice of the first volume (Auk, XVII, pp. 190, 191), the work is a most important contribution to the ornithology of South Africa.

The same publisher will also soon bring out the second part of Volume II of G. E. Shelley's 'Birds of Africa,' thus completing the work, of which Volume I appeared in 1896, and Part I of Volume II in 1900. An extended notice of this important work will be given later.

A new work on 'The Birds of Ireland,' by Richard J. Ussher and Robert Warren, is announced by Gurney & Jackson (London), in one volume, demy octavo, of 450 pages, with 7 plates, 2 maps and other illustrations. Price, £1 10s. Special attention is given to the distribution of each species in Ireland, and also to its seasonal movements within the Island.

The Australian Museum, Sydney, will soon issue, as 'Monograph No. II,' the 'Catalogue of Nests and Eggs of the Birds of Australia,' by Mr. Alfred J. North, Ornithologist to the Australian Museum. This work was first published by the Trustees of the Australian Museum in 1889 as No. XII of their series of 'Catalogues,' but being now out of print, the Trustees have decided to issue a new work in an enlarged form by the same author. There will be representations of about 600 eggs on 30 full-sized plates and arrangements are being made to have them hand-colored for those who desire it.

Some of the nests and breeding haunts of the birds will also be shown on full-sized plates, but the greater number will be interspersed among the text, where also a large number of the birds themselves will be figured. The photographs, from which the plates representing the nests are made, have mostly been taken by the author personally, many of them *in situ*, and show the actual surroundings of the birds' homes. The black and white drawings of the birds are by Mr. Neville Cayley, so well known for his life-like drawings and paintings of birds. The letterpress will contain descriptions of the birds, their nests, eggs and haunts, and an account of their life history. The preparation of the plates is now well advanced. The work will be issued in parts, and the price to subscribers will probably not exceed 25s. for the complete work uncolored. Orders may be sent to the Librarian of the Australian Museum, Sydney, N. S. W., or to Kegan Paul, Trench, Trübner & Co., London, "or any Booksellers."

Those interested in the sanitation of birds' nests will find an interesting communication in the magazine 'Knowledge' for March, 1900 (p. 66), by Mr. Harry F. Witherby, entitled 'Mistle Thrush swallowing Droppings of Young.'

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ERRATA.

Page 72, line 20 from bottom, for **Spinus tristus** read **Spinus tristis**.

Page 97, in title of article, for Geo. G. Beyer read Geo. E. Beyer.

Page 173, line 19 from top, for *Picoides americanus* read *Picoides articus*.

Page 247, in title of article, for *RUFFINUS* read *PUFFINUS*.

Page 346, line 10 from bottom, for **Ammodramus sandwichensis** read **Ammodramus sandwichensis savanna**.

Page 347, line 10 from bottom, for Black-throated Warbler read Black-throated Green Warbler.

Page 357, line 19 from top, for **Anorthura hiemalis pacificus** read **Anorthura hiemalis pacifica**.

Page 357, line 8 from bottom, for **Hylocichla ustulatus** read **Hylocichla ustulata**.

For additional *errata* see p. 324.

By inadvertence, Mr. Knight's 'Some Notes on the Herring Gull,' p. 63, was reprinted on page 169.

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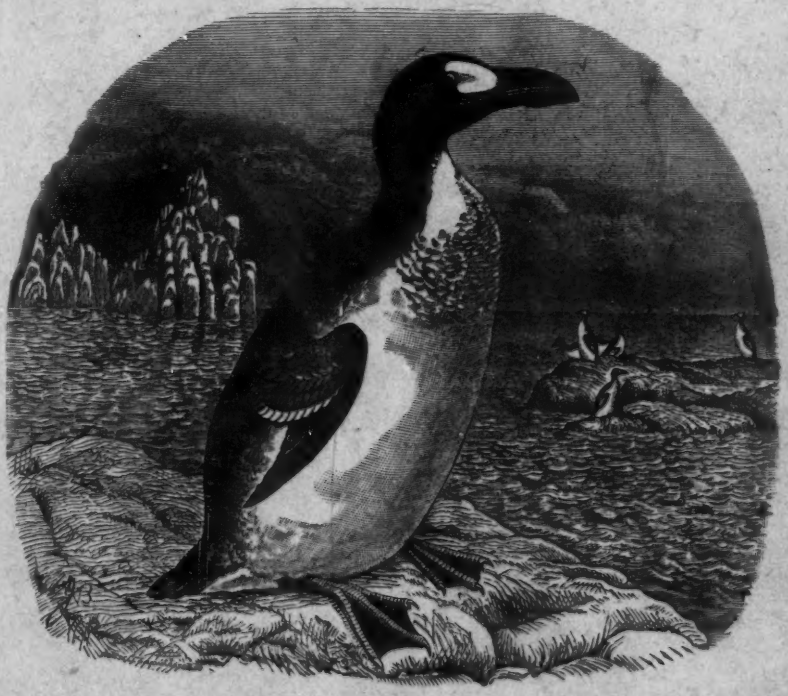

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